The American School and University

A YEARBOOK DEVOTED TO THE DESIGN, CONSTRUCTION, EQUIPMENT, UTILIZATION, AND MAINTENANCE OF EDUCATIONAL BUILDINGS AND GROUNDS

1942

FOURTEENTH ANNUAL EDITION

AMERICAN SCHOOL PUBLISHING CORPORATION

470 FOURTH AVENUE, NEW YORK

Editorial Board of Advisers

Publishers

AMERICAN SCHOOL PUBLISHING CORPORATION, NEW YORK

HAROLD S. BUTTENHEIM
Editor

N. L. ENGELHARDT
Consulting Editor

MARTHA E. BUTTENHEIM
Managing Editor

EDGAR J. BUTTENHEIM, President

PRENTICE C. FORD, Vice-President

Table of Contents

Cumulative Index to Editorial Subjects

This index covers only the present Volume XIV (1942), and Volumes XIII (1941), XII (1940), and XI (1939). A cumulative index to the previous Volumes, I through X, was published in Volume X.

Index to Authors

This index covers only the present Volume XIV (1942), and Volumes XIII (1941), XII (1940), and XI (1939). A cumulative index to authors in Volumes, I through X, was published in Volume X.

SECTION I

NEW FACTORS INFLUENCING THE SCHOOL PLANT

THE IMPACT OF THE WAR UPON SCHOOL BUILDING PLANNING

By N. L. ENGELHARDT

Professor of Education, Teachers College, Columbia University

SCHOOL plant development has followed a more or less fixed pattern over many decades. Planners have thought in terms of a fairly constant curriculum, of traditional pupil-teacher relationships, of limited day-hours of service, and of a regulation nine or ten months' term. For the architect, the beginnings of planning started with the school he himself attended or the ones in which his children were being taught. Building changes affecting safety, sanitation, health, pupil circulation, heating, lighting, and ventilation followed scientific progress. Advancements in educational method, fundamental reconstruction of educational philosophy, and adjustment of education for altering community patterns were only dimly seen and appreciated. They exercised slight influence in school plant adaptation.

State legislation and regulations of state building divisions have tended to freeze building concepts into fixed molds. This is a result that may always be expected when laws are written in specific terminology for one generation. Only the strongest kind of pressure and crystallization of public opinion could succeed in dethroning such standards, once established.

The fact is that standardization and accompanying legislation have been of inestimable value in moving from stupidity and indifference in planning through a period of paternalistic safeguarding of human interests. A terrific disturbance of the foundations of political, economic, and social life, like the present war, affords the opportunity for re-evaluations of past procedures, reweighing of past values, and consideration of the forces determining future policies.

Community Use of School

Annual budgets of fifty billions devoted to national purposes will have a direct bearing on local school plant development. Schools will continue to be built, for we Americans have accepted them as first lines of defense and will in the future use them more constructively on the offense than we have in the past. Communities that are building schools will, however, find less money available for other needed projects. Consolidation of community projects in the one enterprise logically follows. The community school[1] will become more firmly established after the war. It will be planned to serve purposes for which in the past other and separate facilities have been erected. Its grounds will be more spacious, its planning will be in terms of the needs emerging out of community health, physical rehabilitation, better housing, family life, nursery education, economic re-establishment of the community, and vast numbers of group activities for both youth and adult, growing out of war pressures and post-war necessity.

Adult Education

Adult education, still in its infancy, will grow to adulthood in this war. "America will win the war and must win the peace" are convictions commonly expressed today. What is implied for education? Adult learning for all, men and women alike. World strategy, both of war and peace, must become the common knowledge of our people. Day as well as evening conferences and discussions on aviation and its influences on world economy, on intra-hemisphere relations, and on the readjustment of the world's business, the reconstruction of its cities, the restoration of its health will make demands upon the school. Youth will seek to serve and must be provided the laboratories and workshops for action. The hope of mankind will be centered about the amount and character of education that will be provided, not the stilted education of the past, but one associated with rethinking the needs of man and recreating the

[1] Engelhardt, N. L. and Engelhardt, Jr., N. L.: "Planning the Community School." American Book Co., New York, 1940.

political, social, and economic mechanisms for satisfying those needs. What kind of schoolhousing will serve these purposes?

The Middle School and the Youth Regional Center

Youth is today being drawn off to war. The past decades have not served him well. Makeshift organizations, both local and national, have done their bit, but youth's program must be planned definitely in the school. Through an orderly, though unfortunately slow, process, the school organization of the past has changed from the K-8-4 to variations of the K-6-3-3. The junior high school has been tried. Advantages have been discovered, but many disadvantages have been unearthed. The post-war period promises to bring a rapid development of the NS-K-6-4-4 organization. The terms "junior high school" and "high school" may be supplanted by *middle school,* and *youth regional center.* The nursery school will come into wider acceptance. As today, the nation calls on all youth to serve, so tomorrow every youth will call upon the school to provide him the opportunity he needs to continue national service along the lines of his ability. The curriculum must be as broad as life's needs, the courses must be flexible in time and character, the learning opportunities must fit the student's characteristics. What kinds of school buildings will these changes demand? Certainly here lie suggestions of great variations from past planning of classrooms, laboratories, and shops.

Building a Healthful Nation

The first World War left us with the knowledge that many of our youths were physical defectives. The present selective service, with its 50 per cent of physical rejects, has dragged this national disgrace out into the limelight again. Are Americans such a foolish people as to allow a third repetition of this failure to build a strong healthful nation? Many

Students assisting in the cafeteria of a high school, on an NYA student work program

Instruction being given to CCC enrollees of a radio repair class, in methods of testing radio sets and locating defective tubes, shorted coils, and poorly insulated wires

say—"No!" The schools will tackle earnestly this job of building sound men and women as it never has in the past. Small school sites and inadequate and insufficient recreational and body-building facilities will not be countenanced. Gymnasiums, note the plural, will be parts of the school plant. They will not be merely the inner tubes of auditoriums but will be planned for all day and evening service in body-building. Correctional gymnasiums will increase in number. New emphases will be placed upon the use of the out-of-doors. School sites will be measured in real acres instead of square feet. Communities will realize that after all the land is to be used to improve man rather than that man is to be used to improve the land. At least the emphasis should be in the order here given.

The CCC and the NYA

The CCC and the NYA have set patterns for education, the values of which cannot be denied. Their physical plants have frequently emerged as the needs arose. Cut and dried standards did not determine all building design. A dormitory was built to fit a particular need, shops were expanded by youth themselves as they felt the need, and the building of playfields was as important a part of the learning process as their subsequent use. The camp, the farm, the forest preserve, the fish hatchery, the ship-building yard, the shoe-repair shop, and the community gardens should be recognized as necessary parts of the school plant. The future plant may be widely scattered, the camp in the mountains, the ship at the shore, and the farm at the outskirts. The American people will, after this war, sense that education cannot be restricted to classrooms and that life's continuous need for education must be adequately served.

Above—A group of enrollees from a CCC camp are being shown how to time an engine, in a national defense airplane mechanics class at an airport

Right—CCC enrollees in a Cooks and Bakers School are learning how to cut a hind-quarter of beef into the various butcher cuts fancy and otherwise, as part of their routine instruction

Students enrolled in the CCC radio training schools are given a six months' course. Here some of these students are shown seated at a code practice training table; each one has his own key, head set and pad and pencil

Let some one study the contributions that the CCC and NYA have made to educational plant planning and show the way to future adaptations for local use.

Aviation

Aviation will win this war and will win the peace. The glider clubs of Russia and Germany, started less than a decade ago, were looked upon as a faddish sport. "Ski trains" took America's youth out into the country when "glider trains" would have been much more to the point. The fact is that in spite of much vaunted American superiority in aviation, the people and the schools have lagged far behind. For more than a decade, hangars and acres for ground instruction have formed parts of the school facilities for ninth, tenth, and eleventh grade Italian boys, but American boys have been required almost to bootleg aviation into their school curriculum. The German education decrees of 1934 show how aviation was incorporated into every grade of the German schools, beginning with the first and carrying through into the gliding clubs. When automobiles first began their stupendous progress in America, many high schools installed automobile shops. Aviation is already thirty years old, and yet aviation shops, laboratories, and libraries are largely lacking. December 7th at Pearl Harbor is not just a defeat for American arms. It may also be considered evidence of the educational backwardness of our nation in an area where national superiority is imperative. The schools must teach aviation and its impact upon the future economic life of the world. Gliding clubs must become a fixed part of our school organization. Airplanes have moved beyond the play stage for American boys and girls. The fundamentals of flight, construction, and service to mankind must be taught in the school plant and, in fact, stressed in every

Above—Glider and plane clubs should be a part of school work everywhere. Glider and plane model building are fascinating to all youth. These young boys of the Los Angeles schools are representative of thousands who are now attracted to this work and of millions who will be drawn to it in the future

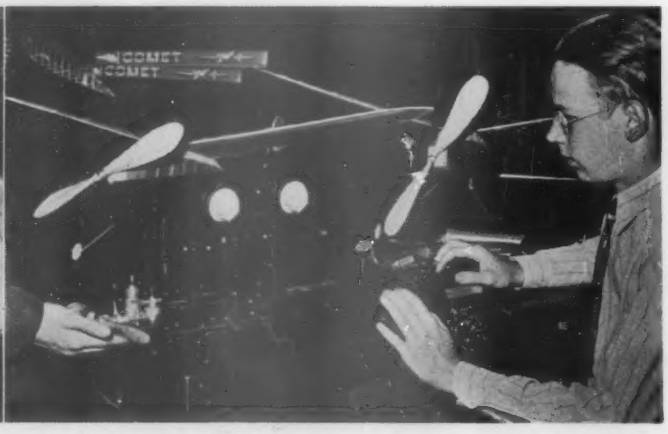
Above — Aircraft drafting students in the Frank Wiggins Trade School, Los Angeles, Calif.

Left—The making and utilization of wind tunnels will become experiences common to many schools

Above—Long Beach (Calif.) student learning to solve problems of communication within the plane and between air and land

Left—Training riveter and bucker on an airplane wing at the Frank Wiggins Trade School, Los Angeles City Schools

Left—A group of boys taking a course in airplane mechanics at the South Vocational High School, Pittsburgh, Pa. and the type of equipment on which they work



An interest in airplane construction is fostered at the Latimer Junior High School, Pittsburgh, Pa. Left—Airplane model building. Right—Testing a model airplane motor

The influence of aviation will be felt in every grade and in every curriculum area. These Los Angeles (Calif.) youngsters are planning an airport and are getting all the concomitant learnings

type of classroom. What differences will aviation make in the planning of site and school?

Internationalism of the World

The school has been conceived as a structure fitted to a flat world based on Mercator's chart. Flat wall maps show deceptive distances. Globes stop with the world's surface. However, man has learned to use the space above, and flies himself and his materials direct. Man's world has really become round and his compass directions adapted to such a world. Note Anne Lindbergh's book—*North to the Orient*. School walls should here and there portray the real surfaces of the earth. Instead of bulging with plaster of Paris imitations of Greek art, let them represent true surfaces of this globular planet. The globe, itself in six, eight, and ten or more feet diameters, should be included in every school's plan, with diaphanous extensions showing the air through which man travels. The internationalism of this world must be taught our children. The removal of time and space barriers must become early child concepts. The child must know his earth as never before. To what degree can school-building planning contribute to this end?

Selective Service Boards

The Selective Service Boards now assigning young men to military service have, in many instances, been given quarters in schools. These Boards may not end their work with the conclusion of the war. The problems of the rehabilitation of the world's cities, the sanitation of living areas, the rebuilding of human health, the restoration of economic life, the policing of totalitarian areas, and the building of new world trade will be fully as important a national service as the defeat of the enemy. The colossal industrial readjustment of this nation from arms production to peaceful living will throw enormous burdens upon the school for many years. The Selective Service Boards may become permanent lay bodies for human adjustment, individual guidance, and community development. The intimate knowledge they have of community life and troubles is an asset not to be thrown away lightly when military service ends. They may still need their quarters and may contribute significantly to the world's reconstruction. One should realize that out of such organizations instituted in time of stress may come advantages that our democracy may wish to conserve for all time. Perhaps the human records of these boards should have a permanent place in the school so that future planning may move forward more adequately.

Decentralization of Cities

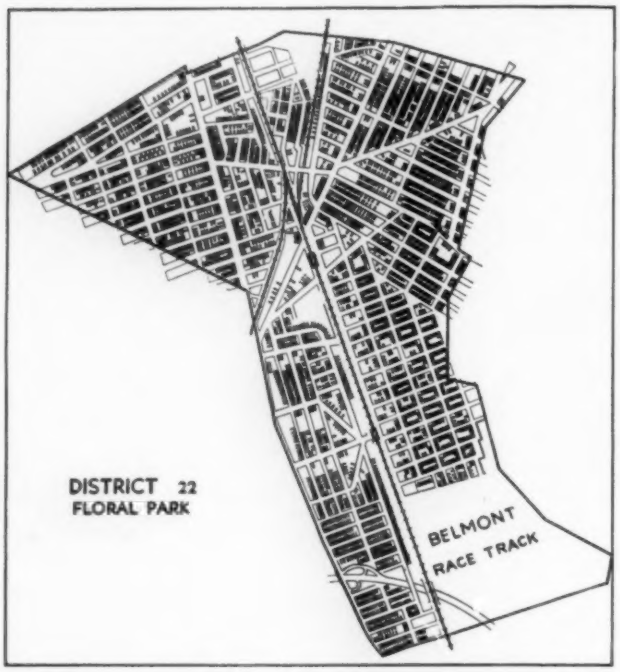
Large-scale housing, both of the apartment and cottage type, will proceed at a prodigious pace after this war. The American people will want and get improvement in home conditions. The rebuilding of cities according to new patterns, and with emphasis on decentralization, is bound to take place. Where does the school fit into such development? Is it merely to be thought of as an aftermath as has been done too frequently in the past, or is it to be fully integrated into the original planning pattern? What kind of school shall it be? What purposes should it serve? What is to be its relationship to parks and playgrounds? For what age ranges should it be conceived?

Instruction in Nutrition

The nutritional needs of our nation, wealthiest in human foods, are being strikingly stressed by statistics of the under-fed and malnourished. Food values, their place in family life, and their importance in agricultural development should play important curricular roles from the earliest grades and upwards.

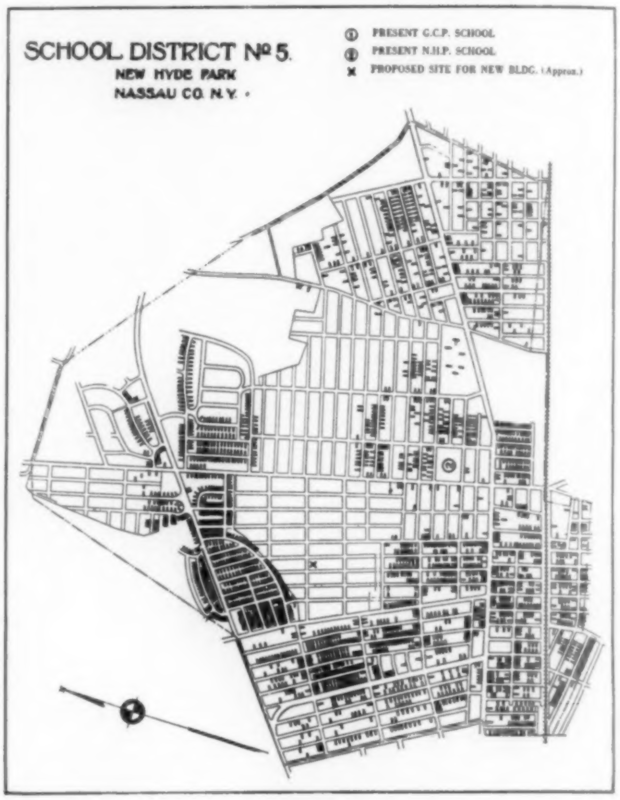
Large Scale Cottage Housing in Elmont, Long Island

New communities are springing up throughout the land. After the war this movement will be given additional impetus. What kinds of school facilities should such communities have to meet both child and adult needs?



Residential Saturation of Two Adjoining School Districts in Long Island

District No. 22 has reached a high degree of residential saturation. Its schools were planned years ago. District No. 5 is experiencing large-scale housing of the cottage type. Its new schools must still be planned. What kinds of schools should be built to meet future needs? As this community reaches residential saturation of a high degree, its elementary school population will begin to decrease. How then can the buildings serve?



Each rectangle represents a home. The dots represent apartment houses. Situation as of July 1, 1941.

Elementary classrooms,[1] stereotyped in size and nature, and planned for 40 seats and 40 feet of blackboard, should be freed from worthless traditional standards. Even in the first grades, instruction in food values can and must be given. The necessary equipment must be provided. An army marches on its stomach,—so does a civilization. Science has taught us food values. Can schools be planned to take advantage of what science has taught us?

Public Work Reserve

Here have been reviewed some of the changes occurring in American life that have bearings upon educational facilities. School buildings, conceived in terms of educational curricula of the past decades, will unfortunately still continue to be built. They may be rated as obsolete the day their doors are first opened. They will serve well in part but they are bound, in the main, to solidify past patterns of education which may not meet future demands. These are times which try men's imagination as well as their courage. The schoolhousing of the future must be founded upon imaginative thinking and planning, with full consideration of the tremendous forces having impact today upon our civilization. The Public Work Reserve, at the conclusion of this war, will be one of the powerful national agencies which will make realities of new worth-while planning.

[1] Engelhardt, N. L. and School Planning Associates: "Elementary School Classrooms, Portfolio A." Bureau of Publications, Teachers College, Columbia University, 1941.

LARGE-SCALE HOUSING AND ITS EDUCATIONAL IMPLICATIONS

By WILLIAM K. KELLER

Supervising Principal, Wharton Borough Public Schools, Wharton, N.J.

THE first recognition that it is a duty of government to provide adequate housing was made when the Shaftsbury act was passed in England in 1851. Since that date practically all the nations of Europe have made provisions for governmental aid or governmental stimulation of adequate housing. These provisions have taken several forms. In England, the governmental housing projects are primarily for the economic underprivileged; in the Scandinavian countries, the housing projects contain typical cross sections of the total population with governmental aid extended only to the underprivileged; in Germany, aid has recently been extended only to the underprivileged whose political beliefs are in accord with those of the Nazi regime. Italy has combined the housing program with the clearing and beautification of her historic shrines.

In America, the public housing program received its greatest initial impetus as a means of creating employment opportunities and only secondarily to create adequate housing. The program has taken several forms, but only two of these are uppermost in the minds of the public; namely, the programs of the United States Housing Authority (USHA) and of the Federal Housing Administration (FHA). The former assists in providing adequate housing for the economically underprivileged, principally in the urban areas; the latter stimulates the building of adequate housing facilities for the middle class of the population.*

The Federal Government does not erect housing projects under either of these programs. USHA loans up to 90 per cent of the total cost of its projects. The management of the project is placed in the hands of local housing authorities which are creations of the local governments. That portion of the cost not furnished by USHA must be supplied by the local government in the form of land, services, cash, or in some other suitable manner. The Federal loans must be repaid and are usually amortized over sixty-year periods. Funds for this amortization are obtained from the receipts of the housing projects. In order to keep the rents low enough to permit the low-income groups to occupy them, the federal and local governments grant subsidies, the Federal Government subsidy being in cash, while the local subsidy may be in the form of remitted taxes or in cash. Subsidies now represent 45 per cent of the project incomes while the rents paid by tenants represent 55 per cent. Thus the projects are in effect tax free, and the tenants pay only 55 per cent of the cost of their housing through rents. FHA is a standard-setting and insuring agency, setting standards for middle-class housing and its environments and insuring the private lending agencies against loss of funds advanced in this program.

It has been estimated that one-third of the people of the nation live in sub-standard homes; a large part of these will eventually be affected by the housing programs. Although there is a temporary lull in the housing program (outside of defense areas) due to the national emergency, it will eventually assume even greater importance when the problem of relieving unemployment returns. Because of the size of the program and the many factors involved, it is only wisdom to attempt to discern the implications which it holds for the American system of education.

Financial and Sociological Implications of the USHA Program

The USHA program, through the Federal subsidies, will add expenses to the Federal Government, the amount of which cannot be determined at this time.* They will be considerable. Tax exemption of projects by local governments detracts from the amount of funds which might otherwise be raised by taxation of real property. Where cash subsidies are paid by the local governments the projects actually consume local tax funds. The Federal Government requires that "equivalent units" be destroyed or renovated; this has resulted in destruction, rather than renovation, and thereby has destroyed and removed taxable properties from the assessment rolls. It is estimated that New York City is already losing $270,000 in taxes each year because of this provision.

Municipal expenses are actually increased by the USHA program. New transportation facilities must be extended and enlarged. Public services, such as

* Since this article was written, these and other agencies of the Federal Government concerned with urban housing have been integrated (February, 1942) into the newly formed National Housing Agency, the functions of which will be exercised through three subsidiaries: the Federal Housing Administration, the Federal Home Loan Bank Administration, and the Federal Public Housing Authority.

* Estimated by USHA (February, 1942) at $75 per family rehoused per year.

water, sewer, fire, and police, must be extended. New school buildings have in many cases been provided to take care of the shifted populations. The cost of eliminating "equivalent units," and other miscellaneous expenses not properly chargeable to the housing project, are approximately $35,000 per $1,000,000 of construction, thereby adding new expenses to the cost of local government. All these expenses must be met from a constantly shrinking local tax base, or else new tax sources must be tapped. The financing of education will thus be made more difficult. In states where the homestead exemption principle (which is essentially the same as the principle of tax exemption of housing projects) is in effect, the deficiency in available local tax funds is made up by taxes collected by the states and redistributed to the local governments. It may safely be assumed that the extension of the USHA program on a broad scale will have the same effect; namely that (1) local taxes will rise; (2) new sources of revenue will be sought; and (3) there will be increased financing of local governmental units, including the schools, from taxes collected by larger units of government.

Many sociological factors also enter which will have far-reaching effects on the schools. To mention only a few of these, it has been established that increased taxation of real estate makes home-owning less attractive and encourages apartment house living. As taxes on real property increase, it can be expected that there will be fewer individual home owners. Family sizes may also be profoundly affected. Apartment dwellers have the fewest children; the size of the dwelling appears to some extent to determine the size of the family. The family sizes of the peoples rehoused by the USHA program will also decrease, if the results of the housing program in Europe are true indicators. In Sweden, where more has been done to rehouse the low-income groups than in any other nation, the birth-rate has declined to only 70 per cent of replacement needs. The birth-rate of the low-income group in Sweden is now below the average for that nation. The same conditions are developing in the English housing projects.

The FHA Program and the Migration to the Suburbs

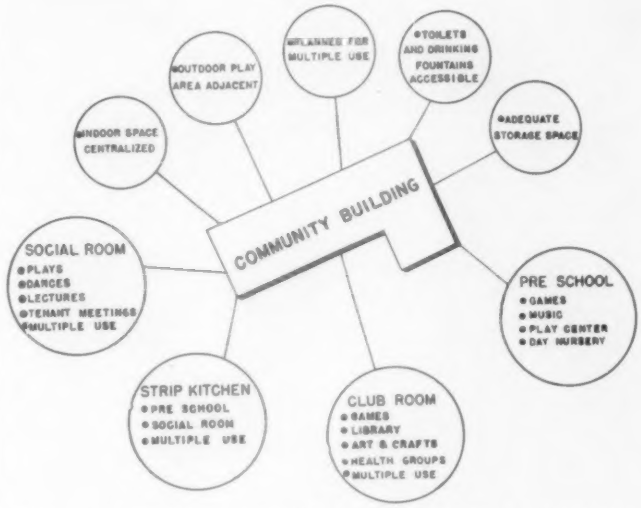
The FHA program is an important factor in the development of suburban areas. Such areas are increasing rapidly in population, the growth being much more rapid than in the adjacent urban areas. The middle-class population is moving to the suburbs, taking its wealth and desirable standards of living with it. New York City, it is estimated, is losing $70,000,000 each year by this movement. Evidences of the effect of this migration are apparent in practically all the larger cities. The problem is nation-wide. The FHA program is increasing the rate at which these changes are taking place.

This migration to the suburbs actually increases municipal expenditures. New arterial highways must be built and maintained; new public service problems are encountered; new traffic protection and controls are necessary. Even while these changes take place, the vacated properties in the cities become occupied by families with lower standards of living and less economic means, and the properties depreciate to a corresponding extent. This migration thus increases municipal costs, draws off the stable middle-class population, reduces property valuations, and shifts the balance of municipal power to less-favored groups. The stable leadership of the cities is also being drawn off. If these problems are to be properly met, the schools must undertake the task through a long-range program.

The Effect on School Financing

Middle-class families, from which the migration to the suburbs takes place, have the fewest children. This migration leaves the larger families in the cities, thus increasing the proportion of children in the total population of urban areas. School costs consequently fall more heavily on the remaining adult residents. The migration also draws off the children who have been more favored socially and economically and leaves a larger proportion of the less-favored children in the urban areas. On the other hand, in the suburban areas the population and the school problems are at first relatively homogeneous, of a high type, and easily financed. However, as the population increases and estates are broken up, and as less select families are attracted to the development, the number of children in the total population increases, while the per capita wealth behind each child decreases. The school program must take on added responsibilities to care for the new arrivals in an attempt to preserve the community status and to educate the new arrivals for better ways of life. In this process, however, the wealth behind the program decreases. Adult education and leisure-time activities which have been noticeably effective in the suburban areas, and in many cases have become integral parts of the school programs, face new problems as the population saturation point is reached and as adequate financing becomes more difficult.

It is a well-known fact that average homes alone will not provide sufficient tax revenues to maintain municipal government, including schools. Homes valued at $4,000 each will produce only $80 annually at a 20 mills tax rate. This alone is not sufficient to provide education for the children who may be expected from the homes. It will be necessary to establish balanced towns, including business areas, manu-



Indoor space should be centrally located in terms of population, and in planning the functional use of space, the various activities which will be conducted should be considered

The central recreation area should provide for special pre-school space: also include features for (1) an apparatus area, (2) a large area for informal play, (3) an area for quiet games, and (4) an area for sports

Courtesy of The American City

ORGANIZATION OF CENTRAL PLAY AREA AND OF COMMUNITY BUILDING IN LOW-RENT HOUSING RECOMMENDED BY THE UNITED STATES HOUSING AUTHORITY

facturing centers, etc., or resort to the collection of taxes from larger economic entities.

Social and Psychological Effects

The numerous social and psychological effects of the housing program are significant. The FHA program has too often taken the form of the speculative construction of small villages or communities in the suburbs, and attracts buyers within narrow income ranges. Entire communities are thus established in which the residents have approximately equal incomes. The FHA program thus segregates and stratifies the middle-class population. Viewed in connection with the USHA program, which not only segregates the entire low-income group in subsidized housing, but further divides this group by building entire projects for persons with definite narrow income ranges, it will be noted that the housing program segregates and stratifies the population on the basis of economic well-being. Democratically, this procedure is unsound. To overcome this undemocratic procedure, the public schools will be called upon for new and intensified democratizing programs.

The "new way of life" presented to the residents of USHA projects, in the way of better living accommodations, nursery and kindergarten schools, medical services, etc., will logically affect their outlooks on life. One needs only to view the propaganda and results of recent elections to realize that a new minority group has already been established which is being called upon to "vote right" at election time. Other problems are also evident. What effect will subsidized housing have on individual freedom of movement? On the search for better jobs and increased incomes? On the loss of personal initiative? On preservation of individuality? How much will these residents, already dependent upon government for their housing, resist further encroachment by bureaucratic government? To what extent will they blindly follow or actually encourage paternalistic government? What will be the social, economic, and personal effects of government subsidies upon the children in the projects? These problems are already upon us and need careful consideration and carefully planned educational programs for their solutions. The one study which has been made (Minneapolis) of the effects of public housing on the social attitudes of the tenants found that the *morale,* that is, the degree to which the residents feel able to cope with the future, and their own *general adjustment*—the feeling of relationship with other people—have actually been lower after a period of residence in a housing project than were the *morale* and *general adjustment* of persons of similar status living in private housing and who were still faced by the realities of life. While further studies are needed, this situation is a definite challenge to the continuance of governmental assistance which is not accompanied by an adequate educational program for the resident adults and their children.

There are also positive implications. The stability of population in USHA projects will enable school and

"Big-City Playground"

"Hell's Kitchen"

Photographs above courtesy of the Citizens' Housing Council of N. Y.

Williamsburg Housing Project Playground

Kitchen in One of the Harlem River Houses

Courtesy of The American City

Willert Park Homes, USHA Project, Buffalo, N. Y.

University Homes, PWA Housing Project, Atlanta, Ga.

As the general level of housing is improved, health, and the many problems arising from environmental conditions, will undoubtedly be easier to meet

housing officials to cooperate in maintaining a steady backlog of enrolments, thus insuring more effective educational planning of buildings, programs, and equipment. If FHA is successful in maintaining better community environments, this result may also be achieved in FHA communities. In any event the school programs, if properly planned and executed, may be much more effective than would be possible in heterogeneous communities. Health, and the many problems arising from environmental conditions, will undoubtedly be easier to meet, as the general level of the residents is improved by housing environments.

Summary

The decentralization of cities, begun at an earlier date, has received tremendous impetus by the housing program. Where this movement was once confined to the well-to-do, it has now reached the middle classes of the population. The cities are being denuded of much of their wealth and leadership, and these are being reestablished in the suburbs. The effects on cities are startling and the changes are fundamental. The less well-to-do with lower standards of living and lower attainable ideals are left in the cities. The USHA program will eventually concentrate a large part of the lower-income group in tax-free and subsidized housing. The results of these migrations and concentrations are everywhere evident. The cities have passed their zenith, and a new day is dawning in which new social and economic problems will call out for solution. The schools will be called on to provide the positive leadership in these new problems.

The housing program is resulting in the stratification of society on narrow economic lines and in segregating these strata into definite areas. It is setting up classes of tax-exempt residents in definite areas. It is extending bureaucratic controls over the lives of the citizens. It may actually be harmful to the morale and general adjustment of the residents. It will result in lower birth rates. These carry definite implications for the education of the future.

The public-school system will be financed more and more by larger units of government. It must protect itself from becoming an instrument of centralized government. It must decide whether it is to continue its efforts on behalf of the individual, or whether major emphasis is to be shifted to community and group needs. It must decide whether the individual or the group is to be the paramount interest of society and to shape its fundamental educational program accordingly. On its decisions may well rest the future "way of life" in America.

Editorial Note.—The author of the foregoing discussion writes to The American School and University: "It is not the intention of this article to attack the housing program. Its purpose is to evaluate the problems which are rising from the housing program and to weigh them in terms of our educational needs." The editors find Mr. Keller's observations concerning social and economic trends highly provocative, and hope that many educators will cooperate with members of public housing authorities and with institutions financing large-scale private housing projects in evaluating the author's comments on the declining birth-rate, on the migration to suburban areas, on the manifestation of economic stratification in geographic segregation, and on the possible development of a group mind marked by loss of initiative.

Two or three other points may merit special consideration:

Under "Social and Psychological Effects" the author seems to imply that it would be better to have no public housing program than to run a risk of "bureaucratic" control of housing projects. But can a democracy afford to sacrifice needed governmental functions merely because government does not always function ideally?

As to the question of tenants' adjustment to environment, a leading authority, Dr. Edith Elmer Wood says that "the consensus in England, Scotland, and the Netherlands, would seem to be that 90 per cent of rehoused families respond favorably to the new environment; under superior management the showing is even better; the age classification is a factor; old people do not change much; children are completely transformed."

This testimony seems more significant than the single study of Minneapolis cited by Mr. Keller—who is right, of course, in pointing out that further studies are needed and that "this situation is a definite challenge to the continuance of governmental assistance which is not accompanied by an adequate educational program for the resident adults and their children."

Mr. Keller points out that as a result of demolition of "equivalent units," the Federal Government has "destroyed and removed taxable properties from the assessment rolls." Is this to be deplored, or do our cities wish to continue indefinitely to derive part of their revenues from continued occupancy of the type of shelter which no civilized community ought to tolerate?

Moreover, experience in the United States with the building of large-scale housing projects on former slum areas is too recent and, as yet, too limited in extent, to make reliable economic data available. While discounting some of the extreme claims of the "housing reformers," one may feel quite certain that improved housing and neighborhood conditions will result in reduced juvenile delinquency and in smaller costs for police, fire, and health protection services, which in slum areas have been demonstrated to constitute a heavy drain upon the municipal income. And also the tremendous social benefits of the housing program, as the author has indicated, necessarily have positive implications for education of a most welcome nature in any final balance sheet.

SECTION II
DESIGN AND CONSTRUCTION OF BUILDINGS

PROBLEMS INVOLVED IN THE REHABILITATION OF SCHOOL BUILDINGS

By GERALD E. IRONS

Commissioner, School Housing and Boundaries, Cleveland Board of Education; Planning Adviser to School Architects

SO LONG as enrolments increase and new school districts develop, the planning and construction of new school buildings is almost certain to require primary attention in the average school system. Revenues for school buildings are never voted without a struggle between altruism and selfish interest in the minds of voters. Therefore, revenues have a way of lagging behind the actual needs for construction. The new areas of a community need school buildings, and the available funds naturally tend to be concentrated largely in the construction of *new* buildings in such districts.

Decreasing Enrolments Provide Opportunity for Rehabilitation of Old Buildings

But when enrolments decrease for several years, there comes an opportunity for the school administrator or the housing specialist to breathe a sigh of relief, and to turn his attention at last to the accumulated needs for rehabilitation of the *old* buildings. True, such buildings have probably been kept in decent repair. They may have been improved from time to time by changes in lighting, better plumbing, or added mounting-boards in the classrooms. Rehabilitation, however, is a more comprehensive word than improvement. It connotes a lifting from one status to another. To rehabilitate an old school may be defined to mean the provision of facilities required to modernize its curriculum, and to infuse a new spirit of pride and loyalty in its pupils, its teachers, and the entire community around it.

The beneficial results of such real rehabilitation must be seen to be appreciated. Even school administrators of long experience have confessed surprise that so great a change in the working atmosphere of a school could come from the addition of a few new activity rooms such as library, craft shop, or gymnasium, and other improvements such as efficient office suites, satisfactory medical clinics, or suitable teachers' rooms.

Organizing the School Rehabilitation Program in Cleveland

My first contact with this problem was in 1927, when I was assigned to prepare a rehabilitation program for the Cleveland Board of Education. In a discussion of that program on May 11, 1928, the following paragraph appears:

> "Of primary importance in this study is to inquire into the differences between satisfactory and unsatisfactory school buildings. If we ask for public expenditures to amplify the facilities of old buildings, there should be good reasons to support such requests. It is necessary to decide which features of an elementary school (for example) are conducive to contented, efficient and spirited school work on the part of both pupils and teachers, to the development of good health and desirable social adjustments in the pupils, and to ease of administration."

We believed that the attributes of a good school building could be described in the following order of importance:

First, safety of life
Second, protection and improvement of health
Third, improved facilities for education

Up to that time, much attention had been given to safety hazards, and Cleveland's schools were reasonably free of them. There had been improvement in sanitary conditions and school lighting.

But thirty elementary schools lacked auditoriums, and fifty schools had no gymnasiums. Twenty-eight schools had neither of these. Many buildings had makeshift offices for principals because when the schools were built there were no principals, except in so far as the teacher of the highest grade would

act as such when necessary. And, of course, there were very few rooms adapted to a modern activity program.

In the junior and senior high schools, the needs were equally pressing because of the increasing enrolment and the rapid multiplication of the curriculum offerings in vocational and manual training.

Therefore, the first problem was to define what we wanted to have; the second was to list the deficiencies of the 160 schools involved; the third to decide the order of priority of needs; the fourth to develop actual schedules of requirements for individual buildings; and the fifth to supervise architectural planning for the necessary structures, when and as funds for new buildings were provided.

This has been a gradual process, and the standards and ideals have shifted as educational policies have evolved.

The growth of the activity program in elementary schools has led to differing methods of housing in different places. In some parts of the country where new buildings were still being erected in large numbers in recent years, the idea of an activity alcove opening out of each classroom has been favored. In an older city, such as Cleveland, the decrease of elementary enrolment has been releasing classrooms, and funds have never been sufficient to rebuild entire buildings on the activity-alcove basis. A more practicable plan in such circumstances is to develop activity *rooms* of classroom size and move the classes to such rooms under a departmentalized program. Having used this method in the old buildings with satisfactory results, we have as yet no demand for change to the activity alcove arrangement, even in a new elementary school.

Following this policy, Cleveland's elementary schools have gradually converted about 350 classrooms into libraries, handcraft rooms, radio rooms, science rooms and, in some of the larger buildings, special rooms for music and art. In a few special situations, metal and wood shops for boys, and food and clothing laboratories for girls are provided.

By June, 1938, the Assistant Superintendent in charge of Cleveland's elementary schools, H. M. Buckley, said:

"At least half of any elementary school building today should be constituted of rooms planned specifically for such purposes as library, science, handcraft, etc. Doubtless half, or a major portion of the building, still needs to be informal enough so that the rooms may be adapted to varying subjects and activities."

This is certainly a far cry from the old days of one classroom, forty pupils, and a teacher. So much activity space in a school building may be questioned by many because of increased cost.

Our actual allowance for such rooms in Cleveland's most recent new elementary building, finished in 1940, was one gymnasium-auditorium, one library, one primary science and radio room, one upper elementary science room, one assembly room seating 140, and one handcraft shop; or 6 rooms in the total of 23 educational rooms in the building. That is, about one-fourth of the total number are specialized activity rooms. This allowance would vary in other school systems, depending upon the relative stress laid on various subjects taught.

First Rehabilitation Program in Cleveland

It has been said that a rehabilitation program was under consideration in this city as early as 1928. But its execution was delayed because of the rapid growth of high-school enrolment which compelled us to erect three new high schools in 1930-32. Not until 1932 were the first rehabilitation projects completed. They were additions to Dunham elementary school and Myron T. Herrick junior high school, both of which were not only lacking in educational facilities, but overcrowded to boot.

Space Saving by Planning

The Myron T. Herrick project involved chiefly enlargement by addition, with only minor remodeling of the old building. Its planning illustrates one of the chief problems for the educational plan consultant. This is the problem of adding necessary facilities without waste of costly space, yet with adequate floor area for the activities to be housed. In the instance of this particular junior high school, a firm of outside architects was retained to make plans and supervise construction. Their first plans called for a new structure of approximately 800,000 cubic feet. After streamlining this plan by rearrangement of its parts to secure greater compactness, with space where needed but no wasted areas, a suggestive revised plan was returned to the architects. It called for a structure containing only 600,000 cubic feet. The architects accepted the revised plan in principle, modified it slightly in one or two places where exterior architecture required change, and the structure was erected in that form, obviously at a large saving.

Now, of course, it is possible to make savings in cubage in wrong ways which will cramp and handicap the educational processes forever after. The dividing line between reasonable economy with educational adequacy on the one hand, and foolish economy by omitting essential service areas on the other, is difficult to draw, and no two individuals will ever fully agree on its exact location. Nevertheless, someone must make the attempt.

In order to achieve successful cooperative results, it is desirable for the school planner to have had some

engineering training and construction experience, as well as a working knowledge of educational policies and methods. If the architects also combine experience in school building with their knowledge of materials and construction, the results should be satisfactory to all concerned.

Second Rehabilitation Program

The next efforts in rehabilitation of schools in Cleveland came about with the help of the PWA in 1935-36. At that time, $1,500,000 was spent for nine projects, seven of which could be classified as rehabilitation projects. For this program, the Board of Education relied upon its own employees for all architectural services, Arthur F. Baer representing the Business Department as Chief Draftsman-Architect, and the writer representing the Educational Department as plan consultant and adviser on educational requirements.

Addition to West High School, 1935-36

The largest project in this program was an addition to the West High School, which houses 2,300 pupils in grades 7 to 12—a combination junior and senior high school. We should have preferred to erect a separate junior high school, and to rehabilitate the old school for high-school use, but the cost of improved property for a site, plus three-quarters of a million dollars for a new building, prohibited this plan. The addition was completed at a cost of only $474,000.

This addition to the old building involved a most complicated job of planning. To do a thorough job, it was necessary to work out just what facilities were needed to provide a complete and modern plant to meet curriculum requirements for the existing enrolment in Grades 7 to 12 (keeping in mind probable future decrease). These facilities then had to be properly planned and located by departments, including space in both the old building and a separate brick annex and in the proposed addition. The eight frame portables on the site had to be replaced, of course.

After much study of possible schemes within the very restricted site area available (with streets on three sides), we were able to devise a successful plan which joined both existing buildings through a new structure. The old auditorium and balcony on the third and fourth floors of the old building were converted into part of the new lunchroom area.

"Attic" rooms in the original building were fireproofed and relighted, and provided with acoustic

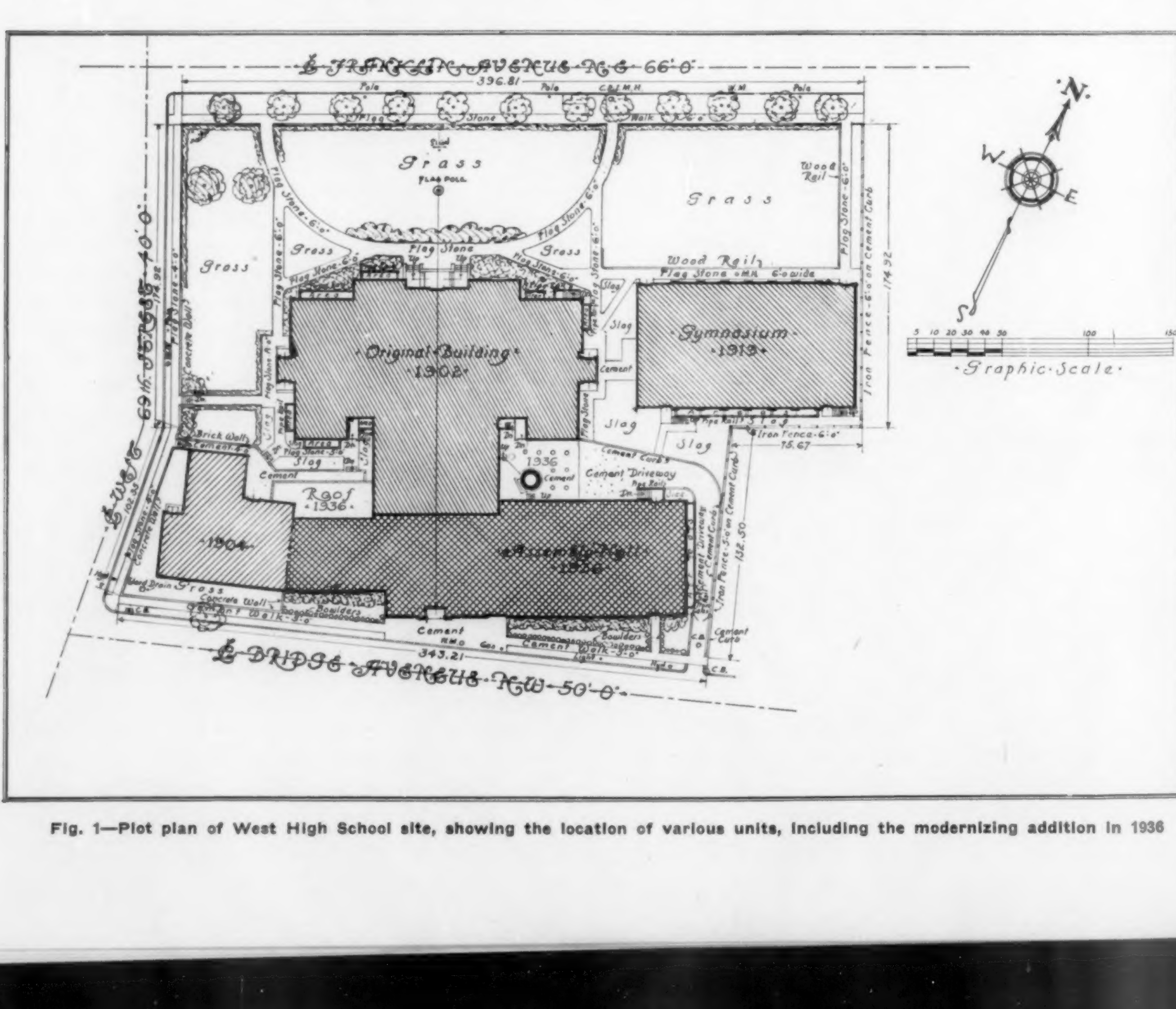


Fig. 1—Plot plan of West High School site, showing the location of various units, including the modernizing addition in 1936

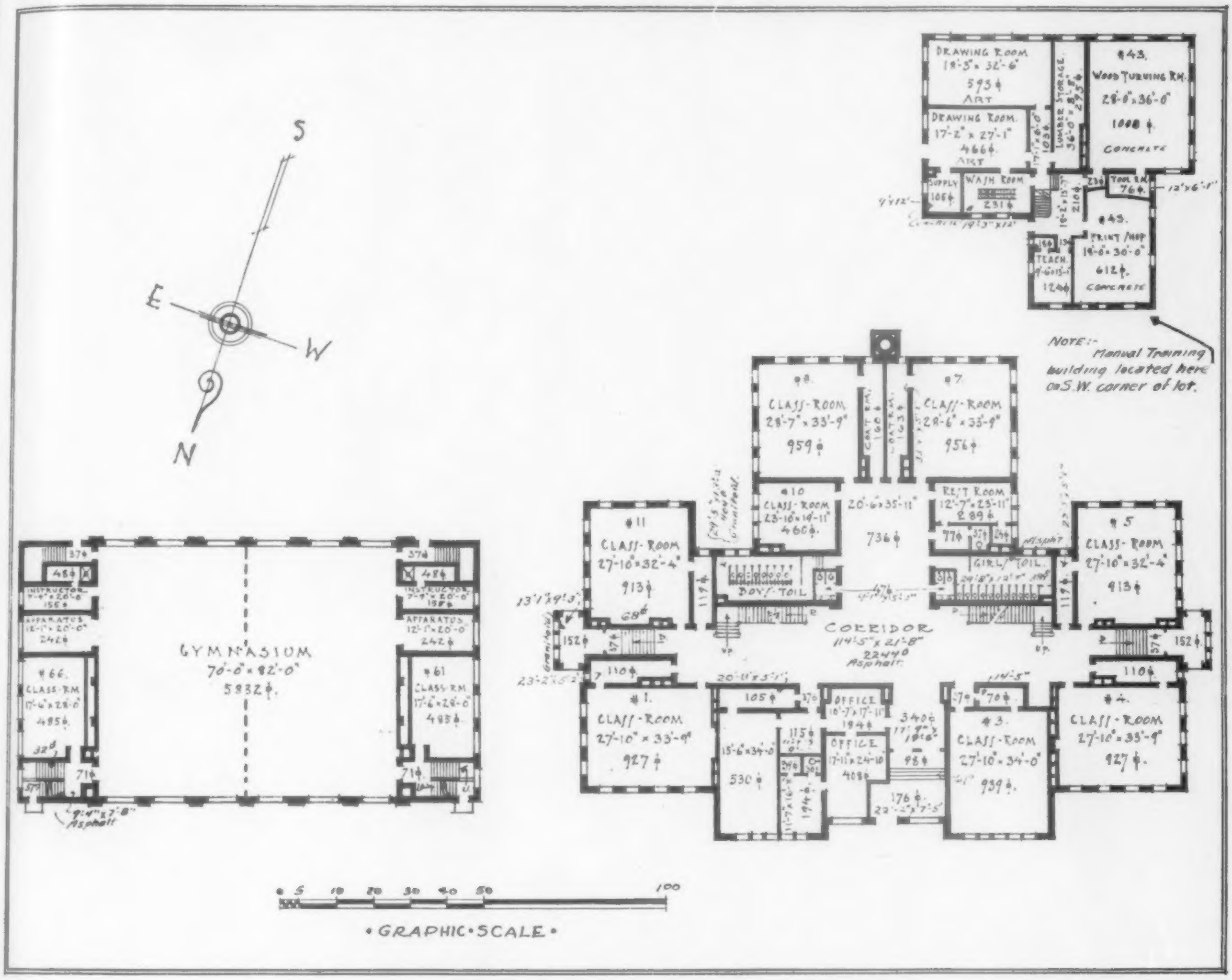


Fig. 2—West High School, first floor plan before rehabilitation

treatment where needed. The cramped and inefficient offices were entirely rebuilt by remodeling within the old structure. The accompanying plot plan and floor layouts of the first floor, before and after rehabilitation, show the extent of the changes and the method of tying the units together.

This project involved us in one of the problems which often confront those who rebuild old structures —what to do with the pupils while construction goes on. This was met by (1) re-housing the junior high school for one year in an old abandoned building, renovated for the purpose (later converted to use by a special girls' school); (2) keeping the senior high school in session in the original building at West High, while construction of the annex went on; and (3) remodeling inside the old building in summer vacation to complete the plant for re-occupancy by the entire organization. The following September the junior high school returned and the organization was again united. There were no interruptions for the pupils.

Many shops and laboratories were relocated and improved, either in existing rooms or in the new annex. Provision was made for public address and radio systems, electric clocks, and thermostatic control of heating. Toilet rooms were improved with new floors, fixtures, and marble, as required, and additional toilet facilities added where needed. The new auditorium, seating 1,100 persons, was conveniently located on the rear street, and can be operated independently.

Rehabilitation and Enlargement of Jane Addams Vocational School for Girls, 1935-36

Somewhat similar to the West High problem was the Jane Addams project. Its requirements for 1,000 pupils were smaller in scale, but again involved much study by all concerned to achieve an improvement in arrangement of activities and to coordinate departments in both old and new buildings.

New offices were built in an old classroom, and a few other remodeling jobs carried out, some redecorat-

ing done (as, for example, in a new tea room tastefully decorated and furnished, and a gift shop for sale of girls' work), but for the most part this job consisted of addition of five new clothing shops, and a new cafeteria-kitchen suite, also used as a study hall.

This project modernized the Jane Addams school to an acceptable degree at a total cost of $101,000.

Additions to and Modernizing of Five Elementary Schools, 1935-36

Five of these projects were planned to improve and modernize some of the older elementary schools. The schools selected were those which combined large enrolment and grave lack of facilities for modern education. By name, they were the Hough, Landon, Kinsman, Waverly, and Bolton Schools. These projects included gymnasium-auditoriums, new offices, medical clinics, teachers' rooms, libraries, craft shops, science rooms, and other spaces as the individual needs dictated. Together they cost about $450,000.

Selection of Schools for Rehabilitation

Making selections of schools for rehabilitation involves a problem of future use which must never be overlooked.

It would be foolish in the extreme to spend public funds for enlargement and remodeling of a school plant which is not properly located on the basis of population needs so that it may serve a useful purpose in the school system for many years to come. Public confidence would soon be lost.

Therefore, one of the first requisites in the preparation of a rehabilitation program is a survey of the school plant with a view toward selection of buildings which are well located for future use. In other words, key centers must be selected, leaving the doubtful cases for further study as time passes.

By following this policy, many mistakes will be avoided. We know by this time that the population of city districts does not rise to a peak and remain there. Nor does it subside from the peak to a stabilized plateau. Howard Whipple Green exploded that idea in his census studies of Boston, St. Louis, and Cleveland.* He showed that population of a given urban area rises to a peak and almost immediately starts to fall again—and that it continues to decrease in the ordinary course of events, until the area becomes completely industrialized or converted to other non-residential uses. The entire cycle from start to finish has required about 100 years in the few Cleveland city districts whose life history was complete when this study was made. Of course, exceptions will be found, particularly in areas where the Federal Government is trying to rescue blighted areas by enormous housing projects. But such areas are very

* See "City Growth and Decay Revealed by Census Figures," *Engineering News-Record*, Feb. 9, 1933. Also "Population Trends Bring Building Problem," by G. E. Irons, *Nation's Schools*, August, 1936.

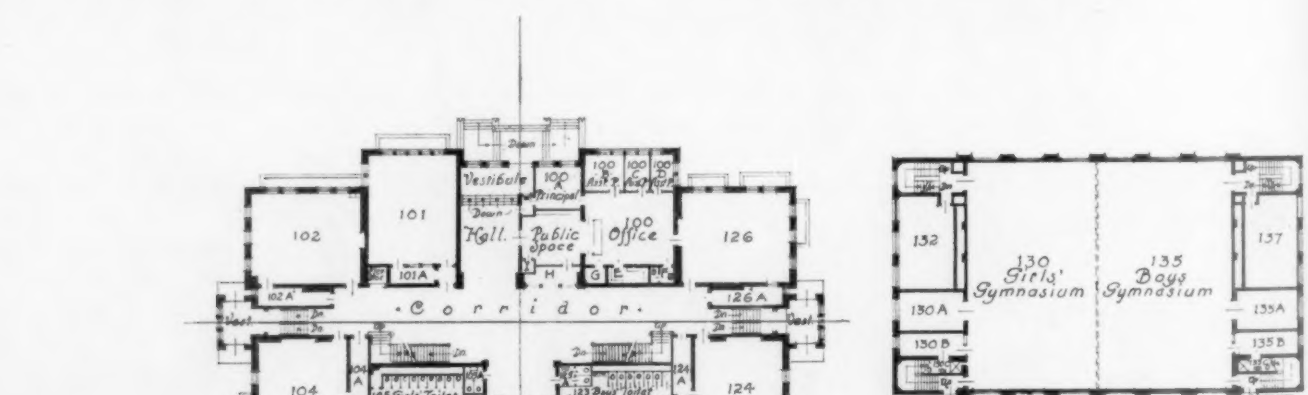


Fig. 3—West High School, first floor plan after rehabilitation and addition

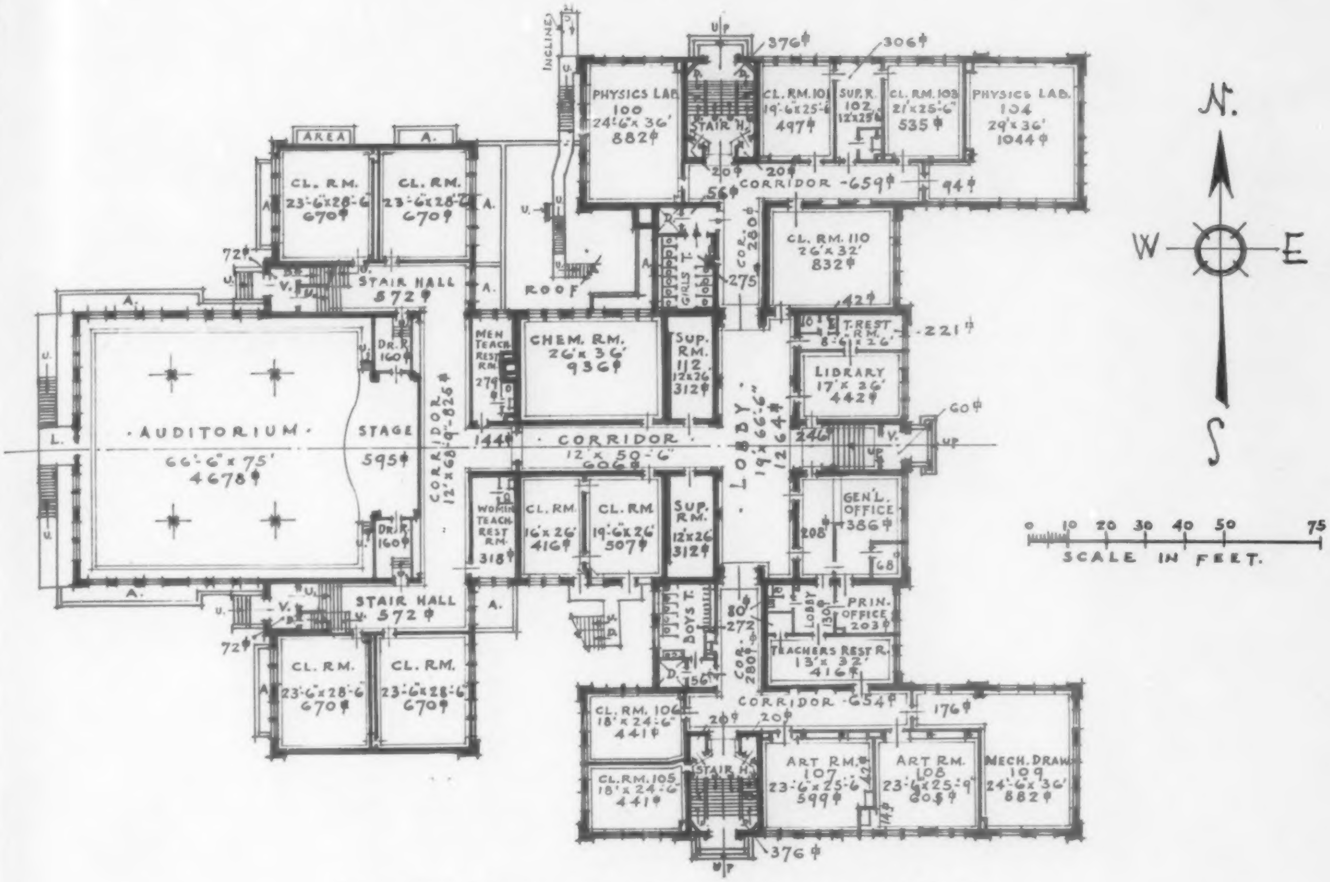


Fig. 4—Glenville High School, first floor plan before rehabilitation

minor parts of the whole picture, and caution is therefore recommended.

Already we have found that schools which looked like good long-term prospects fifteen years ago are now depleted, and may soon be candidates for abandonment. But because of careful attention to the population trends and the geographic locations, we have not yet had cause to regret our action in remodeling the key buildings within the past decade. In fact, it is easier to abandon a poorly located old school if there is in the neighborhood a modernized building to which children may be sent.

With these words of caution, let us return to the main line again to see if any other problems can be discovered in the course of one city's experience in the rehabilitation field.

Third Rehabilitation Program

In 1938, another PWA-Board of Education program involving expenditure of $4,500,000 got under way in this city. This included three new buildings (Central High, William Dean Howells Jr. High, and Kentucky Elementary) to replace obsolete buildings, one small addition to the Cleveland Trade School (for boys), two additions to High Schools, one addition to a Junior High School, and fourteen additions to elementary schools. Some remodeling of existing structures was included with every one of the additions. Also, some maintenance requirements such as strengthening of floors or roofs, and modernization of heating and toilet facilities at twenty other buildings, were included in the program. Preliminary floor plans for these projects were prepared by Arthur F. Baer, chief draftsman-architect, and the writer. Working drawings and specifications for the entire program were furnished by the architectural firm of Harry A. Fulton, of Cleveland.

Obviously, this program is all "rehabilitation." Not a single new structure for an outlying district was included, because no such building was needed at this time.

The rehabilitation of elementary schools has now proceeded to the point where all well-located Cleveland schools above the 500-pupil level in enrolment have received attention with major construction of one kind or another. Smaller schools have had minor improvements, because we spend from $25,000 to $50,000 of current tax funds each year for minor educational remodeling and adaptation of existing buildings.

To furnish some ideas of the changes brought about in the schools affected, I invite the reader's attention

to brief description and illustration of three projects among the many mentioned above.

Glenville High School Addition

This school, housing 1,400 pupils now, began its career in the village of Glenville in 1904. In 1905, the village entered Cleveland. In 1911 and 1922, additions to the building were erected. From 1930 onward, consideration was given to its rehabilitation because the auditorium was small and lacking in adequate stage accommodations, the one gymnasium was insufficient, its locker and shower rooms unsanitary, dark, and poorly ventilated, and the basement cafeteria crowded, noisy, and unusable as a satisfactory study hall. Minor needs were a better medical dispensary or clinic, and a better women's rest room. Other requirements such as administrative offices, photographic dark-rooms, storage facilities for free textbooks, and remodeled quarters for band and orchestra practice, had been met reasonably well in prior years by alterations of existing rooms. But the larger needs called for a major operation. The 1939 PWA-Board of Education Program offered the opportunity and the means.

A comparison of Figure 4 and Figure 5 will give some idea of how these needs were met, after many other schemes had been drawn, discussed and rejected. Difficult problems of floor levels and drainage levels had to be met in order to secure adequate ceiling height in the girls' remodeled gymnasium, which is below the old auditorium (see Figure 4). To be noted are the conversion of the old auditorium and stage into the new lunchroom, with a new kitchen and service suite added at the rear; the convenient location and arrangement of the new boys' gymnasium and the new auditorium, each a self-contained unit with separate entrance, and each capable of independent operation. The old gymnasium was increased in ceiling height, a running track and four columns were taken out, and the old locker rooms remodeled into team rooms and gymnasium storage. The new first-floor corridor beside this gymnasium was left open on one side, and provides an added spectators' balcony much appreciated by the principal.

The first major production of the Glenville High School Players in the new auditorium was "Abe Lincoln in Illinois," by Robert E. Sherwood, on December 19, 20, 21, 1940. The program for that event carried the following descriptive paragraphs written by the director of dramatic activities, Eugene E. Davis:

"Glenville High School is rejoicing this year in the possession of an auditorium (at long last) which is adequate to the production of its dramatic and musical performances as well as all other activities of the school.

"This building is the product of much thinking and planning in which the latest up-to-the-minute experience in this type of architecture has been utilized. The plans from which it was constructed embrace every modern feature which has any real value to a high-school auditorium. Indeed, it is better equipped than many college buildings of the kind and compares favorably with many commercial theaters.

"The commodious stage is 28 feet deep and 67 feet wide, with a proscenium opening 20 feet high and 35 feet wide. It

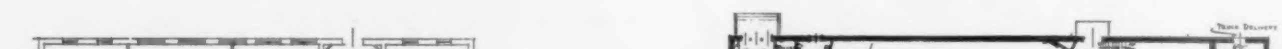


Fig. 5—Glenville High School, first floor plan after rehabilitation and addition

Glenville High School. Left—The new addition is taking form, the old structure in the background. Below—Exterior of the new boys' gymnasium and west entrance to the addition

has a 36-foot loft, adequate for flying any scenery we are likely to use in future productions. Immediately to the rear of the stage and on the same floor level is a workshop 55 feet long and 15 feet wide. The electrical equipment is modern in every respect and has been installed in such a manner as to secure the greatest degree of flexibility. The orchestra pit is large enough to accommodate a 60-piece orchestra, and under the stage are commodious and easily accessible dressing rooms and storage rooms for stage properties.

"The possession of such stage facilities makes it possible for Glenville to present all its public performances, including band and orchestra concerts, in its own premises for the first time in history. It will also make possible the production of a more ambitious repertory of dramatic and musical events as well as an expanded program of general school assemblies.

"The acoustic properties of the audience room are practically perfect. The theater is so arranged that every seat in the house is a good seat for both seeing and hearing."

Auditorium capacity is 1,070.

Special attention should be called to the orchestra pit in this layout. It is perhaps the only feature which might be called new in school practice. The ordinary school orchestra pit is a relic of vaudeville days when a small orchestra played appropriate music for the juggler or the performing seals. Music supervisors have long complained of the inadequacy of such spaces in schools where large orchestras of 90 pieces are organized and available for operatic and choral performances.

To enlarge the pit sufficiently in front of the stage would either sacrifice seating space or wastefully enlarge the cubage of the entire structure. Therefore, we have adopted a scheme used in some commercial theaters and recommended for school use by Music Supervisor Russell V. Morgan, that is, to recess part

Glenville High School. Above—Entrance to the new auditorium. Right—Interior of remodeled girls' gymnasium. Columns and running track removed; ceiling height increased; new locker rooms in the background. Lighting fixtures not yet installed

of the orchestra pit under the front of the stage. This scheme has proved very successful in actual operation, both in the Glenville addition and in the new Central High School. Access to this pit is provided from below stage as well as from the audience room, under the new arrangement.

The total cost of this project was $438,800. This may seem rather high when one considers the fact that the actual increase in enrolment *capacity* is relatively small, and that the school was not overcrowded to begin with.

Obviously, this represents a large investment in modernization alone, for which the justification is to be found only in increased effectiveness of the educational program. The new auditorium provides an integrating influence in a community where the residents have unusual interest in and talent for dramatic and musical performances. They are said to be somewhat lacking in taste for physical activity. The principal of the school, Clayton R. Wise, hopes to foster and develop the taste for dramatics and music in the new auditorium, and to arouse greater interest in physical education in the improved gymnastic facilities.

Albert Bushnell Hart Junior High School

Next, let us look at the before and after drawings of the Albert Bushnell Hart Junior High School. An addition to this building was another item in the most recent program. This example is not presented because the final result is anywhere near ideal. But it does offer an interesting example of the type of situation in which vast improvement can be made in a very unsatisfactory plant with a relatively modest outlay for new construction.

As will be seen from the first-floor plan, Figure 7, the building was a hodgepodge of the original South High School, erected in 1894, plus annexes built in 1904 and 1920. Plans were made to remodel it while it was still South High School, but those plans were abandoned and an entirely new structure built to house South High, in 1931-32. Renamed Albert Bushnell Hart, the old building continued in use as a junior high school, still overcrowded and using three

Fig. 6—Albert Bushnell Hart Junior High School, plot plan of site before rehabilitation of the plant

Left—Old pottery workrooms torn out, ready for new construction

Right—New pottery unit about ready for use

Left — Four cramped home-economics rooms being transformed into a new lunchroom. Note new glass-brick windows to keep out street noises and other annoyances

Right—Illustrating several aspects of rehabilitation: (a) the bank of windows necessary to get enough light into old classrooms with windows blocked on one side by new construction; (b) new fire-escape doors cut from old windows; (c) new construction of the latest addition

Albert Bushnell Hart Junior High School

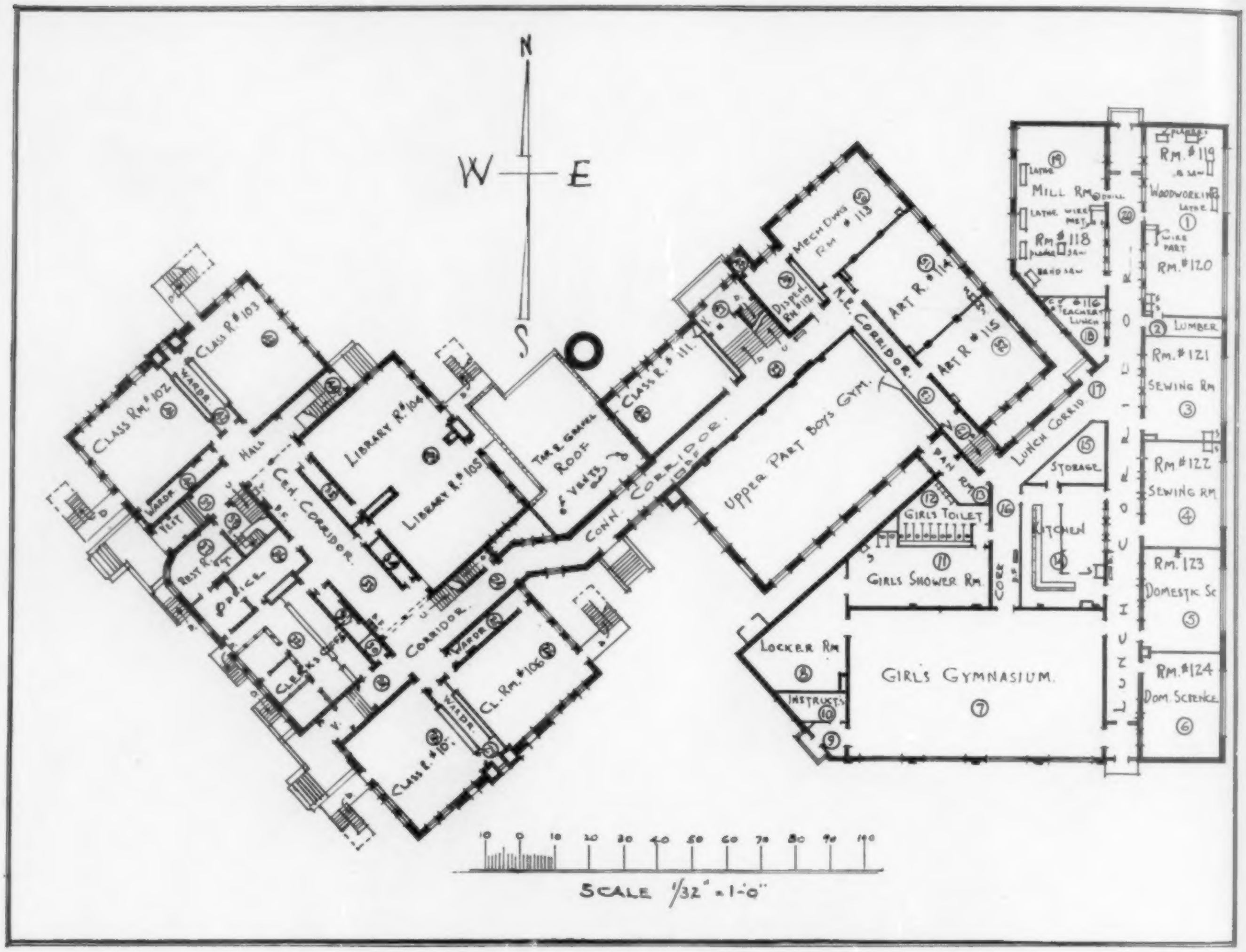


Fig. 7—Albert Bushnell Hart Junior High School, first floor plan before rehabilitation

portable classrooms, a double-portable room as a metal shop, and another wooden structure with brick annex as a pottery workshop and kiln-room (where pottery objects were fired for many other schools of the city).

The building had no lunchroom, using the corridor in the rear annex for this purpose. Its print-shop was in a dark basement room. Its home economics department was crowded into four small rooms without adequate storage or class space, and with ground-floor windows having panels through which over-ripe tomatoes and other tokens of esteem could be, and were, thrown into the rooms from the adjacent street sidewalk.

Altogether, this building was about as bad a medley of misfits and makeshifts as one could discover.

By reference to Figures 7 and 8, it will be seen that the following changes have been made to rehabilitate this school to a level where it no longer suffers greatly by comparison with new buildings:

(1) The four small home economics rooms have been moved to larger quarters on the second floor, with adequate storage space. One of the foods laboratories is in the new construction which bridges the space formerly left between the oldest building and its first addition. Both foods laboratories have the latest type of kitchen alcove equipment, linoleum floor covering, and new "silver-bowl diffuser" lighting fixtures. They are shining, spick-and-span models of attractive cleanliness.

(2) The space these rooms occupied, plus the adjoining corridor, has been transformed into a commodious lunchroom, with glass-block windows impervious both to cat-calls and refuse from the street. A new teachers' lunchroom is included, with the old teachers' lunchroom converted into a finishing room for the wood shop.

(3) The double wooden portable has disappeared, and a modern metal shop appears in the new unit.

(4) The wooden pottery shop has been replaced by a new brick structure tied into the main build-

ing. It includes a room alternatively useful either as pottery display room, conference room, or classroom, as needs dictate.

(5) The print-shop has moved from the basement to larger new quarters, leaving the old room available as a recreation room for table games or ping-pong.

(6) Improved locker and shower facilities are provided for the girls.

Thus the worst "headaches" of this old building were removed, to the great delight of its occupants, at a total cost of $95,000. It still has a few deficiencies of a nature not easily amenable to rehabilitation without great cost, such as an inadequate auditorium and stage, and unsatisfactory gymnasium and locker room facilities for the boys. But, on the whole, the building will now serve the purpose of a modern junior high school without great handicaps.

It is difficult to choose an example among the 18 elementary buildings so far rehabilitated, because no two are exactly alike and each one presented interesting problems of planning.

However, the R. B. Hayes project probably combines as many features of interest as any which might be chosen.

Rutherford B. Hayes Elementary School

As shown on the before-and-after floor plans, this building lacked gymnasium and auditorium, had a very small principal's office improvised on a stair landing, and equally inadequate dispensary and teachers' rooms. Its two kindergartens were ordinary classrooms, and the overcrowding of the building (with two portables in use) made it impossible to convert any rooms for use as craft shop or library or for visual education-radio purposes.

It must be kept in mind that Cleveland is a pioneer in radio education, with the first public school broadcasting station in the country. Its program in this field has expanded into almost every subject taught.

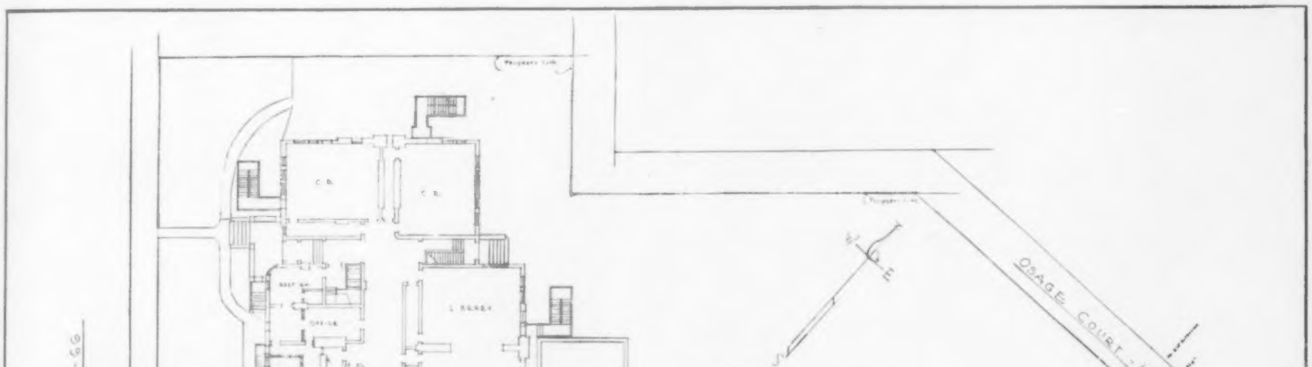


Fig. 8—Albert Bushnell Hart Junior High School, first floor plan after rehabilitation

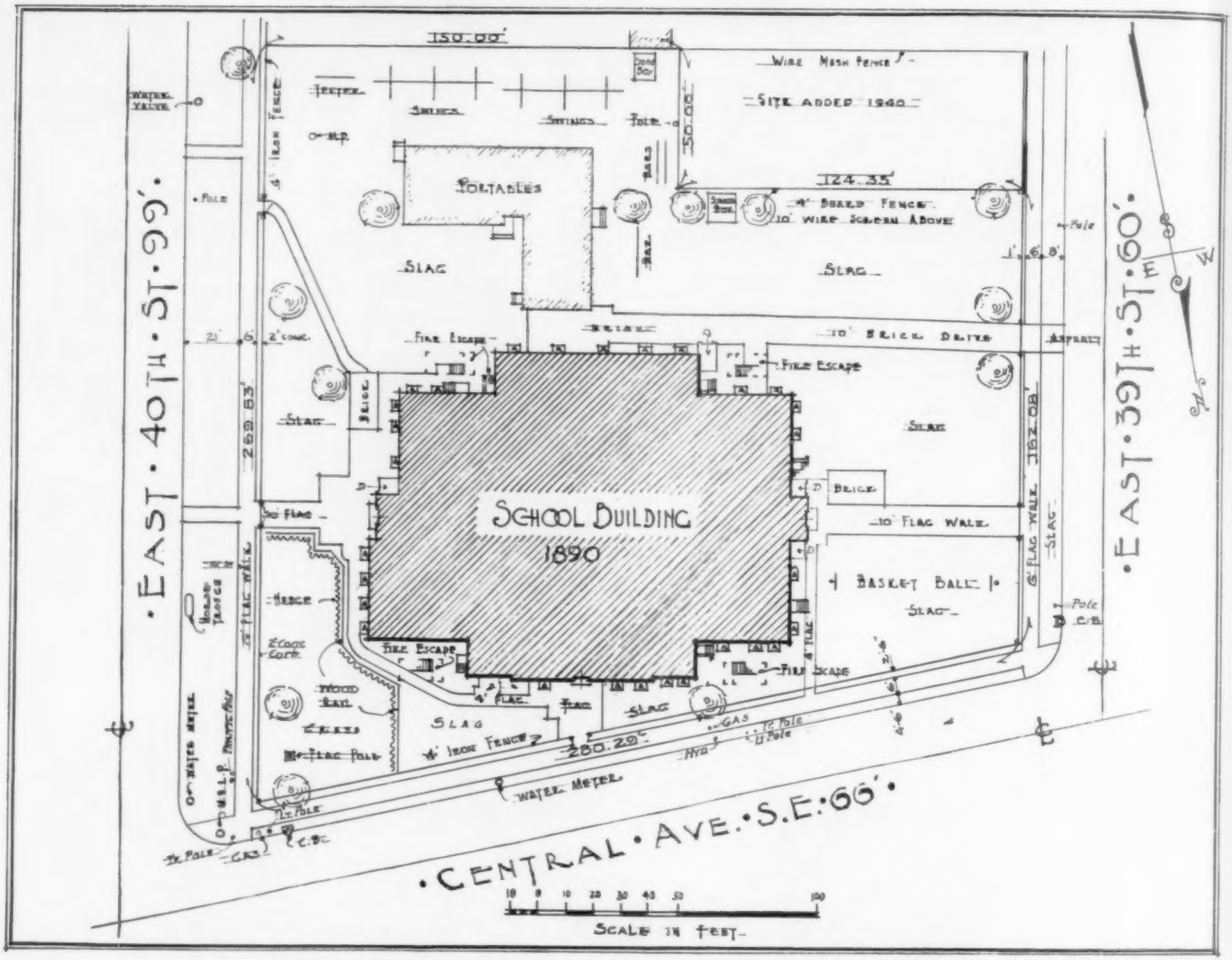


Fig. 9—Rutherford B. Hayes Elementary School, plot plan of site before rehabilitation and addition

Therefore, provision for reception of the broadcasts in a suitable working environment is necessary. Reception in an auditorium atmosphere has been found unsatisfactory because the seating lacks the working surfaces of school desks, and student seat work is a valuable and necessary part of successful teaching by radio.

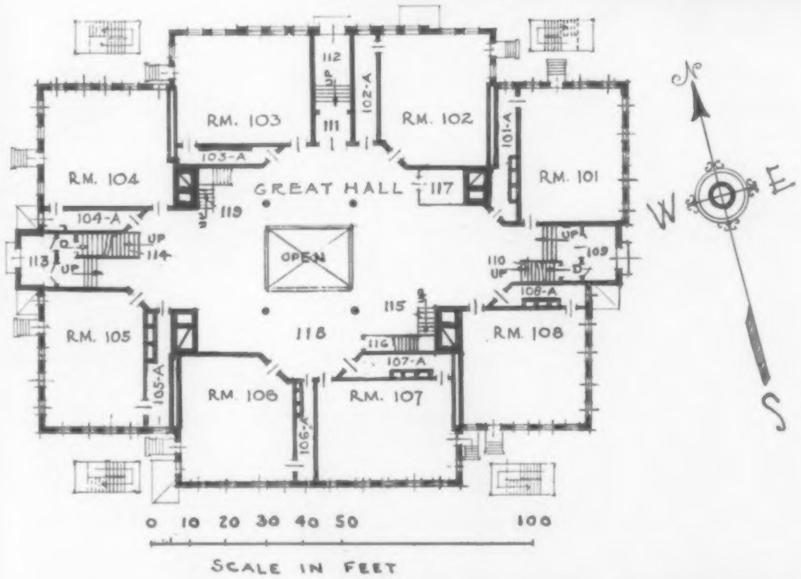
If the receiving set is easily portable, or if the school from its school fund can afford to buy several sets, the broadcasts may be received in the classrooms by the classes concerned. However, many broadcasts require use of lantern slides also, which requires darkening of the room, and an electrical outlet for the lantern.

Hence, the most economical and satisfactory housing for visual and radio education in the elementary school seems to consist of an ordinary large classroom, with the rear half of the floor elevated in steps, and seated with tablet armchairs in close formation, so that about 90 pupils can be seated at one time. Opaque window blinds provide darkening facilities; electric outlets at front and rear provide connections for lantern and radio. A map rail on the front wall is useful for hanging maps or charts. Finally, a small adjoining storeroom is desirable for storing radio sets, lanterns, slides and films.

Attention to Figure 11 will show that all the requirements mentioned above have been met in economical fashion. Even the heating system had to be changed in this building, to get rid of a number of obsolete time- and coal-wasting hot-air furnaces. New boilers and steam radiation with unit ventilators were installed.

The kindergartens were relocated into old classrooms improved with new toilets, storage facilities, acoustic ceilings, linoleum floors, and mounting board. One classroom has been converted into a visual-education and radio room. A library, a craft shop, gym-auditorium, dispensary (medical examining room), principal's office suite, and four classrooms have been added to the building in new construction. The old pupil toilet rooms in the basement were modernized.

Right—New addition beginning to rise



Rutherford B. Hayes Elementary School

Left—First floor plan before rehabilitation and addition

Right—Interior of new gymnasium-auditorium nearing completion

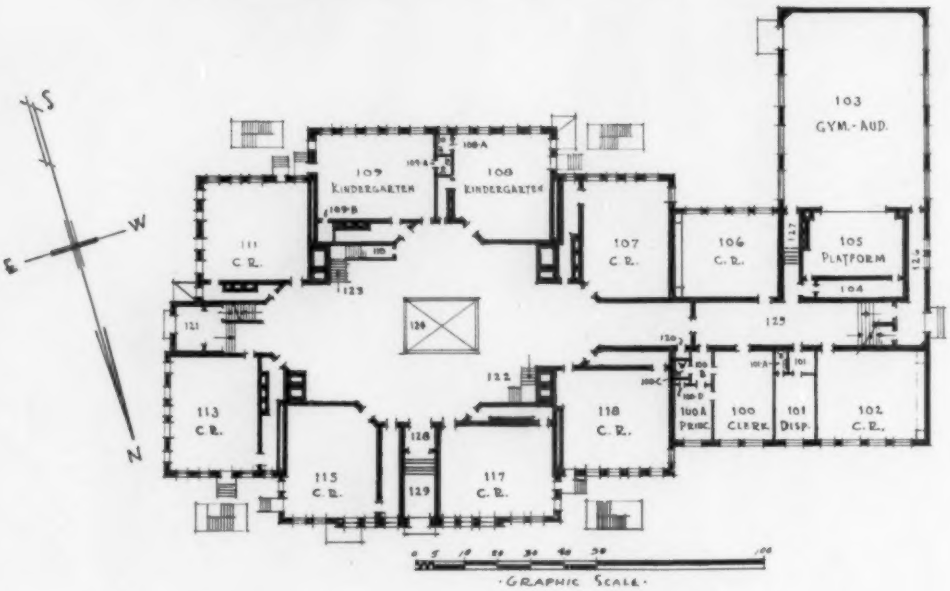


Fig. 11—Rutherford B. Hayes Elementary School, first floor plan after rehabilitation and addition

Acoustic treatment was provided in the new addition and in the remodeled rooms in the old building.

The playground was enlarged enough to compensate partially for the ground area used for the new structure. The "portables" are gone from the site.

In other words, this building project includes just about every feature which comes under the heading of rehabilitation. Its facilities for safety, protection of health, and improvement of educational processes have all been increased or bettered until the plant as a whole compares reasonably well with any building in this city. Yet the entire cost of the work was only **$146,300**, including land cost and all equipment and service charges.

Rehabilitation Is Economical If—

The modernization of old buildings is feasible and worth while if the planning is intelligent both from the educational and the architectural points of view. Care must be given to proper integration of the old and new parts of the remodeled building. The tearing-out of old walls and floors should be kept to a minimum because such replacement is more expensive than new construction. By thoughtful adaptations of cloakroom areas and similar spaces, many modern activity rooms can be provided in old buildings without much alteration of the *existing* structure.

Careful study must be given to population trends, in selection of buildings to be rehabilitated.

If such procedure be followed, rehabilitation not only is practicable but may also be economical. Its value in education can be fully appreciated only by those who have seen the uplift which becomes evident in the morale of teachers, pupils, and school patrons, after improvements have been provided which will meet the needs of modern education.

A SCORE CARD FOR SCHOOL PLANTS ACCOMMODATING BOTH ELEMENTARY AND SECONDARY GRADES

By A. D. DOTTER

Temporary Assistant, Division of Finance, Bureau of Field Services, The University of the State of New York

THE modern twelve-grade school plant has achieved a significance not held by its predecessor of a decade or two ago. With better roads and more advantageous transportation facilities, the number of one-room schools is steadily decreasing, while the number of consolidated schools is as surely increasing. The development of modern motor vehicles and snow-removal apparatus makes it practicable to transport school children comfortably, safely, and conveniently nearly every day of the year in almost all parts of the country. The advantages and disadvantages of the one-room school and the modern consolidated school do not properly belong to the subject at hand, but a study of the school transportation figures of almost any state will confirm the statement already made that the number of one-room schools will decline in the future, and the importance of the twelve-grade school in the educational régime is assured.

Naturally, the question arises: What are the important factors to be considered in providing proper twelve-grade school plants, or what are the important changes necessary in utilizing a school plant originally designed to serve a limited village situation but now made to fulfil the needs of a larger area and an enriched curriculum? A score card for school plants accommodating both elementary and secondary grades is a criterion that will aid in determining these facts. The score card discussed in this article was developed for that purpose.

Determining the Values

No effort was spared in its development to assure the reliability of the score card. Its development was begun by recording all the factors concerning school plants considered important by persons working in school plants, by authorities writing on school plants, and by architects of school buildings, as well as by reviewing the building codes and building regulations or suggestions presented by 36 state departments of education and by incorporating their ideas. While it is true that every educator and every school-building expert consulted in connection with this study of school plants seemed to emphasize the particular phase of the school plant that he deemed most important, nevertheless the consideration of many ideas aided in making the list of significant factors more comprehensive.

After a list of over 1,300 factors was developed and organized, their values were judged by the extent to which the various factors were put into practice. To determine this, a study was made of the outstanding school plants housing both elementary and secondary grades in seven eastern states. The buildings studied were selected after consulting the state departments of education. The better modern schools were studied because they are the most likely to contain the two kinds of features essential today, those that have been tested and proved valuable, as well as the newer ideas in school-plant construction. The former indicate a certain consistency in school buildings; the latter, the trends of the future.

The material collected as a result of the study was recorded and tabulated. When the information concerning a factor consisted of a numerical recording, such as the height of the wainscoting in the corridor or the width of the stage, the median value was determined and also the range of the middle 50 per cent. With items like the type of gymnasium floor used or the provision made for pupils' wraps, the number of each type was found. In other cases there seemed to be a relationship between the number of elementary and secondary pupils that the building was designed to house and the factor involved, as in the case of the number of toilets provided or the amount of space devoted to science laboratories. Among some factors, however, no relationship seemed to exist; for example, the length and width of the corridors.

The Score Card

Standards for the various factors contained in the score card have been set up on three different levels. For the want of better terms they were named *good*, *fair*, and *poor*. The standards thus set up should increase the reliability of the score card, since they furnish the scorer with distinct differentiations on which to base his estimates. The first quartile, or the practices found no longer to be generally followed, were the basis upon which the standards for *poor* were determined. The median values, or the practices found to be most common, were used as the basis for

the determination of the standards for *fair.* The standards for *good* were based upon the third quartile values, or practices found now being adopted by the better, most recently constructed plants; in all instances they were definitely indicated trends. Whether a practice was considered *good, fair,* or *poor,* in many cases was determined by the regard in which that practice is held by authorities in the field and by the experience that school people have had with it.

The *values* stated after the various factors of the score card under the headings—*good, fair,* and *poor*—are the result of value judgments obtained from 80 persons considered competent to render such judgments. A special effort was made to obtain people qualified by training and experience to render these evaluations. Only persons who were trained in the field of education, or who are now working in it, were selected. In fact only 8 of the 80 persons rendering value judgments had neither a formal course in school-plant construction nor the experience, as a school administrator, of directing a building program.

Every one acquainted with school plants has his own idea of what he himself considers *good, fair,* and *poor* for the various factors. There are those perhaps, who

	G	F	P	S	
I. Site					126
1. Accessibility	30	19	10		
2. Environment	26	16	8		
3. Physical features	22	13	6		
4. Size and form	32	20	9		
5. Landscaping	16	10	4		
II. Building					175
1. Placement	20	12	6		
2. Foundations	21	12	6		
3. Walls	18	11	6		
4. Roof	18	11	6		
5. Height	12	7	4		
6. Entrances	15	9	5		
7. Corridors	19	11	6		
8. Stairways	19	11	5		
9. Basement	13	8	4		
10. Condition of plant	20	12	6		
III. Classrooms					194
1. Size	28	18	9		
2. Illumination	30	18	8		
3. Shades	13	8	4		
4. Floors	17	10	5		
5. Walls and ceilings	17	10	5		
6. Doors	10	6	3		
7. Chalkboards	15	9	4		
8. Bulletin boards	13	7	4		
9. Wardrobes	14	8	4		
10. Built-in equipment	17	10	5		
11. Movable equipment	20	11	6		

	G	F	P	S	
IV. Special Classrooms					156
1. Kindergarten	20	12	6		
2. Science rooms	22	13	7		
3. Homemaking rooms	22	13	8		
4. Shops	22	13	8		
5. Commercial room	18	11	6		
6. Art room	16	9	5		
7. Music room	17	11	5		
8. Agriculture room	19	11	6		
V. General Service Rooms					123
1. Auditorium	29	18	9		
2. Gymnasium	34	20	11		
3. Library	35	22	12		
4. Cafeteria	25	15	8		
VI. Administrative Rooms					81
1. Office suite	21	13	7		
2. Teachers' rooms	13	8	4		
3. Health suites	20	12	6		
4. Janitors' rooms	12	7	4		
5. School garage	15	9	4		
VII. Service Systems					145
1. Heating and ventilating	28	17	9		
2. Fire protection	19	11	5		
3. Cleaning	16	10	5		
4. Artificial lighting	18	10	5		
5. Electric service	13	8	4		
6. Water supply	19	11	5		
7. Drinking fountains	13	7	4		
8. Toilets	19	12	6		

Score card for school plants accommodating both elementary and secondary grades; G, good; F, fair; P, poor; S, score assigned

will not agree with the standards as set up. However, the weights assigned to the factors do show how important that factor has been considered by the majority of those rendering judgments on the basis of a 1,000 points assigned to the entire school plant.

Problems of a School Accommodating Elementary and Secondary Grades

Lack of space prevents the inclusion of the standards in this article. However, an attempt will be made to point out in the case of a few factors wherein a school plant accommodating both elementary and secondary grades has problems peculiarly its own. The fact that a twelve-grade building is found in an area where the number of children to be educated does not warrant the erection of separate school plants to house the elementary and the secondary pupils is fundamentally important. A great many factors in a school plant accommodating both elementary and secondary grades must be designed to serve more than one purpose. The limited number of children makes the highly specialized plants found in the cities prohibitive, and demands instead extremely versatile buildings.

The Site

As the site is a tremendously important factor in deciding whether the school plant meets all the needs of the community it serves, sentiment and tradition should not determine its selection. Most rural areas are physically able to provide adequate school sites for twelve-grade buildings in wholesome environments and without undue hazards if the community is informed in respect to the requirements, and if local prejudice and jealousy can be overridden. The accessibility of a site in a rural area will be determined largely by the existing transportation systems and the natural barriers rather than by its location in the approximate geographic center of the section that it serves. The size of the site for a twelve-grade building is a major factor. Consideration must be given not only to the play areas for elementary children and secondary groups, but also to the fact that the play areas of the school are very often the only developed play areas found in the community; nor does it seem wise for a rural community to provide and maintain more than one play center. To provide for all that is demanded of it, no site should contain less than ten acres; twelve to fifteen would be much better.

The rural school plant is usually one of the few landscaped public institutions found in the community. It should be a just source of local pride from all angles instead of presenting, as it too often does, a pleasing appearance only from the front. Walks, roadways, parking areas, play areas, and drinking fountains—all should be planned details in the landscaping of the school site. Many rural communities fail to use the abundance of local trees and shrubs available, and instead create a formal, stilted environment for the school entirely out of keeping with its surroundings. All play areas should be placed far enough away from the building so that those working in the building will not be annoyed, for the varying schedules of the different age-groups necessitates playground activity at all times.

The Building Plan

Good principles of building construction apply as rigidly to the twelve-grade building as they apply to any other type of school plant, but because of the varied purposes that the building serves, its floor plan must be developed most expertly. The elementary and the secondary children should be kept from conflicting with each other as much as possible. Generally, the elementary pupils are confined to the first floor and the secondary pupils to the second. In certain types of well-planned buildings, however, confining the elementary pupils to one end of the building and the secondary group to the other is a more effective means of avoiding conflict. It should not be necessary for elementary and secondary children to use the same corridor at the same time, and still each member of a group must have ready access to any part of the building to which his duties may take him at the time. Moreover, all parts of the building used by the community should be so arranged that their use will in no way interfere with the work of the school. The absence of corridor conflicts and of outside distractions is usually the result of a carefully planned building as well as a well-considered program.

Classrooms

Since the twelve-grade building must be versatile and adaptable and efficient as well, it should be provided with as many small secondary classrooms as its pupil capacity suggests. Provision ought also to be made for the expansion or the reduction of the size of several of the classrooms as the needs may fluctuate.

Moreover, if a twelve-grade building is to be efficiently utilized, careful consideration must be given to the designing of the several special classrooms. As the number of pupils generally enrolled does not require the use of a special classroom every period in the day, a highly specialized room will not be used sufficiently to warrant its construction; however, an adaptation of several related special rooms into one unit can be most usable.

In larger twelve-grade buildings, for example, not more than two classroom units will be devoted to all the sciences. One storeroom should be so located that

it can serve both units. As each room must provide both for recitation and for laboratory work, a general laboratory must be located in the room where recitations in science are conducted. The cost of providing separate laboratories for general science, physics, physiography, chemistry, and biology is prohibitive even in the larger twelve-grade schools. In the smaller twelve-grade buildings, a one-room science unit will serve for all the recitation and laboratory work in all the sciences. The rear of the room will be equipped with laboratory tables, and a demonstration desk should be placed at the front of the room with space provided for armchairs. A storeroom, adequate for all the sciences taught, should be conveniently located. It should be equipped with a sink and running water, and provisions made so that it can serve as a dark-room upon occasion. Moreover, one of the walls should consist largely of wall cabinets with glass doors for approximately the upper two-thirds, and of cabinets with solid doors or drawers in the lower one-third section. It may be necessary to give some consideration to the use of this room by the pupils in the elementary grades also. A good science program is not dependent upon elaborate equipment, but planning an effective science unit for such a varied program as most twelve-grade schools demand is a highly specialized problem.

Special Suites

Economy requires that the work in housekeeping, cooking, clothing, dressmaking, millinery, and other home arts be carried on in an efficient suite, $1\frac{1}{2}$ to $2\frac{1}{2}$ classroom units in size. This also necessitates very careful planning. One end of the unit should be devoted to food preparation and laundry activities, and the other end to sewing and home management.

Science room adapted for laboratory and regular class work. Note demonstration desk at the front of the room and cabinets along one wall

This science room is equipped with armchairs for the convenience of students during regular class work

Regular class work in a home-making room

An attractive home-making room used for divers activities

Because of their multiple use, the homemaking rooms in twelve-grade buildings are not often examples of home planning and home decorating, or else they are not practical food laboratories and sewing rooms. Linoleum or composition flooring may be used on the kitchen part of the unit, and some type of hard wood flooring on the sewing end. A type of tile wainscoting in the kitchen is advantageous. Some type of folding partition between the kitchen and living room is almost a necessity. A direct exit often is an asset to the homemaking suite, especially if the rooms are utilized for small group parties or adult education, and when the homemaking rooms are located near the cafeteria, the facilities of each are of mutual advantage upon many occasions. Proper storage space must be planned for every kind of work that will be carried on in this unit. The homemaking rooms should be equipped to approach the home conditions found in the majority of the better homes in the school area. Unit kitchens should be planned. Even breakfast nooks are not impractical impossibilities. Carefully built-in equipment will aid in creating a homelike atmosphere when the equipment is not in use, for the sewing end of the room must become a combination living-dining room upon demand.

Planning a really practical shop for a twelve-grade school is almost as difficult as designing a workable home unit. Too many shops are merely classrooms in which some shop equipment has been placed. No wonder the results are unsatisfactory. Neither classroom walls, ceilings, nor floors are durable enough for shop purposes. The shop unit will have to serve junior high-school classes, agricultural classes, and industrial arts classes, as well as any other shop projects that may be required to serve the needs of the community. A classroom, separated from it by

means of a sound-absorbing wall, should be adjacent to the shop unit. Adequate light in the shop is of vital importance, and here again ample storage space for all the varied types of work and material is mandatory.

The commercial room in a twelve-grade building will have to serve all the commercial classes included in the curriculum, and in addition it may be used by non-commercial classes. Efficient use of this room requires the affixing of the typewriters to a drophead type of desk so that the desks can be used conveniently for bookkeeping, as well as any non-commercial subject. Sufficient filing space should be provided for each pupil and teacher, and also storage space for any materials used in the room. Space at the rear of the room should be available for the machines commonly found in business offices. A lavatory is a decided convenience. The room used for typewriting and for operating noisy business machines should have some form of accoustical material applied, at least to the ceiling.

Combination Units

Perhaps the examples given show that the twelve-grade building is a school building with a distinct identity among school plants. The art room, the music room, the cafeteria, as well as others, might be discussed in this article. All special rooms in a twelve-grade building should be planned so that they can serve dual or multiple purposes. Any part of the building serving more than one purpose should have storage space available for each purpose served. If the cafeteria, for example, is used as a music room also, convenient space should be provided adjacent to the cafeteria for the storage of musical supplies and instruments. Double- or multiple-purpose rooms

School band in a cafeteria adapted for music activities or small community gatherings

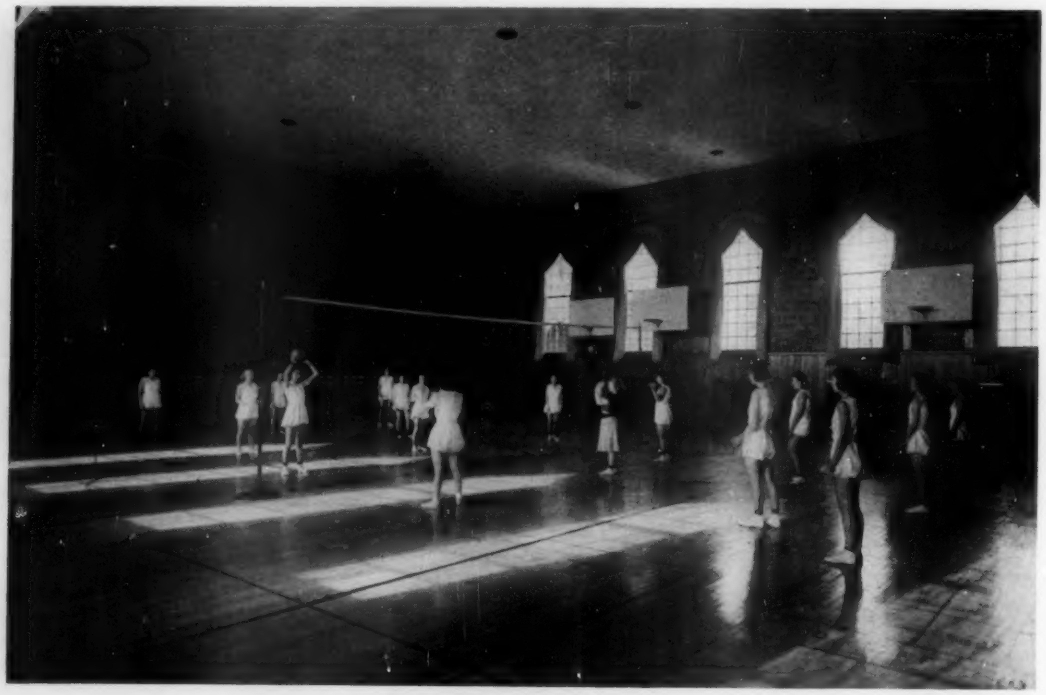
Art room with desks the tops of which can be lowered, so that the room can be used for other purposes

Library being used as a study hall

demand adequate storage space for each purpose if they are to serve efficiently.

Perhaps one more illustration will be sufficient to show how skilfully a twelve-grade building should be planned. Many communities find it necessary to provide auditorium and gymnasium facilities in the same unit. This unit too often is not considered separately in its two distinct roles. As a result, it is neither suitable as an auditorium nor acceptable as a gymnasium. While the room should be planned and constructed basically as a gymnasium, its adaptation as an auditorium must be satisfactory. The attractive appearance in many combinations is achieved by the use of ornamentations and finishes that are not durable enough to serve adequately for gymnasium purposes. This unit should be attractive because of its tasteful simplicity. Folding bleachers properly finished and recessed into the walls can be made to add to the appearance of the unit. It is neither wise nor necessary to expose a grand piano or stage scenery to the hazards of gymnasium activities. Separate and convenient storage space for both purposes is too

Study hour in a school library

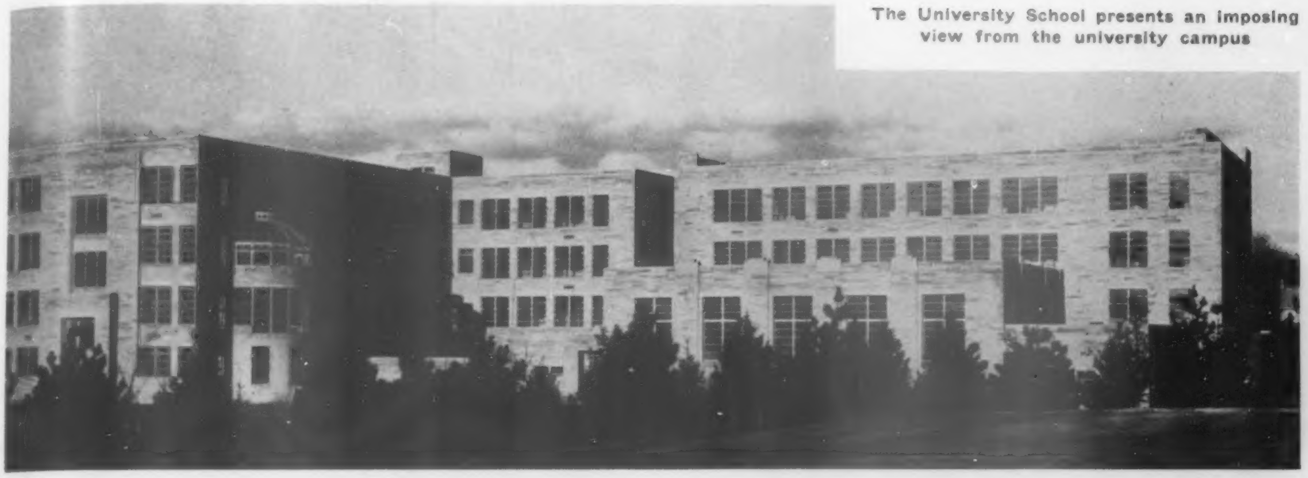


A combination gymnasium - auditorium that does not make too attractive an auditorium. Note the plain cinder block walls

often lacking. Likewise, most combinations seem to lack the large, durable wall space necessary in a gymnasium, and the acoustical properties needed in a good auditorium. Too frequently the locker rooms, shower rooms, and the rooms for the instructors of physical education, are not readily accessible to the combination unit. Traffic to and from the locker and shower rooms often conflicts with the natural traffic found in all twelve-grade buildings, especially with the traffic of the elementary grades.

The greatest problem of the school plant accommodating both elementary and secondary grades is, as has been emphasized, to provide adequately with a minimum of friction for multiple use of a single unit. It is a problem that has not received the careful attention and thought in the past that it must receive in the future if the twelve-grade building is to achieve a greater utilization and to serve the expanding program of the elementary and secondary grades more efficiently.

An elementary classroom with an adjacent storeroom and cloakroom



The University School presents an imposing view from the university campus

A MODERN SCHOOL PLANT FOR TRAINING TEACHERS

By R. W. HOLMSTEDT

Professor of Education, Indiana University

THE opening of the University School in September, 1938, marked the beginning of the second century of teacher training at Indiana University. It was in 1838 that President Wylie of the University first called attention to the need for ". . . instruction and practice of teachers in the Science of Education and the Art of Teaching." Except for a brief period during the 1850's in which a model school was operated, Indiana University had provided no special facilities for the training of teachers until the opening of the University School. Practice teaching and observation had been carried on in local elementary and high schools through a cooperative arrangement with the school city of Bloomington. During the three years that the University School has been in operation it has become the center of an extensive program for the training of educators for the State of Indiana. The fact that approximately one-third of all the graduates of Indiana University have entered the teaching profession is evidence of the importance to the people of Indiana of the program which is being developed around the University School.

Objectives of the University School

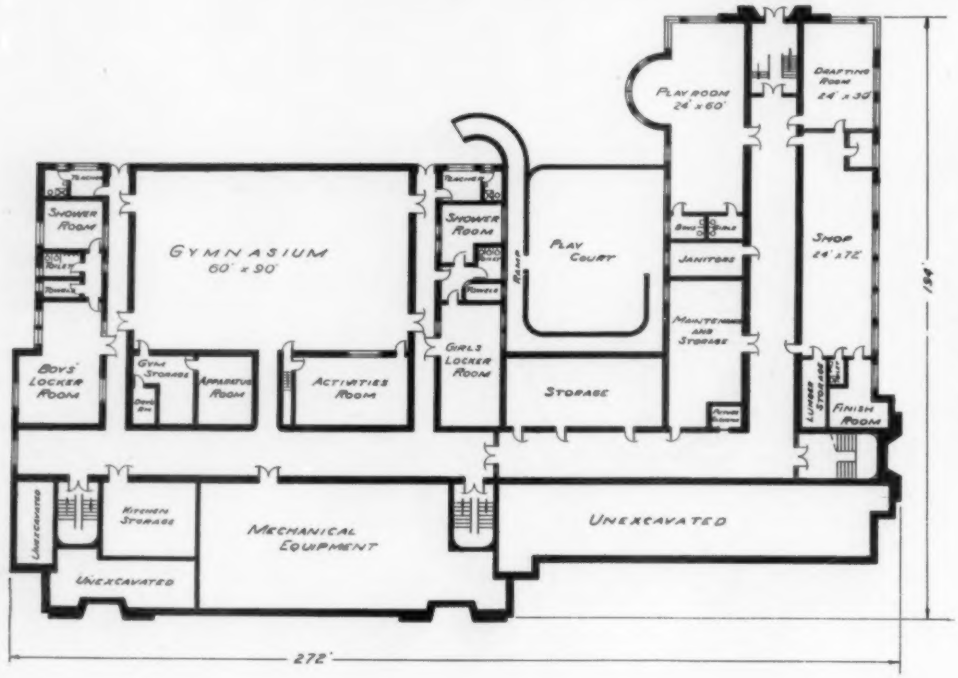
The plant and equipment facilities of the school were planned on a functional basis. The faculty of the School of Education of Indiana University agreed that the University School should serve the following purposes:

1. To provide a superior type of instruction for the children attending the University School.
2. To train prospective teachers, supervisors and administrators through opportunities to observe superior teaching and to teach under the direction of superior teachers.
3. To promote sound educational theory and practice through research and experimentation.
4. To provide a progressive public school the practices of which may be critically observed by educators of the state, thus promoting educational improvement in local school systems.

The committee in charge of planning the school gave careful attention to all details of building construction and equipment which would in any way affect the achievement of the purposes of the school.

The University School is designed to accommodate a complete school from the nursery school through grade twelve with an enrolment of 600 to 700 pupils, and to provide facilities for observation and practice teaching for approximately 250 student teachers. In addition, the school serves as a laboratory for the training of school supervisors and administrators as well as providing opportunities for an extensive program of research and experimentation.

The school is organized on the 6-6 basis. For the school year 1941-42 the enrolment will approximate 25 pupils in the kindergarten, 180 pupils in grades one to six, and 500 pupils in grades seven to twelve. The nursery school unit has not yet been put in operation. The staff of the school consists of 7 teachers in the kindergarten-elementary unit and 28 teachers in the junior-senior high-school unit. The administrative and supervisory staff includes the principal of the school, a full-time director of secondary teacher train-



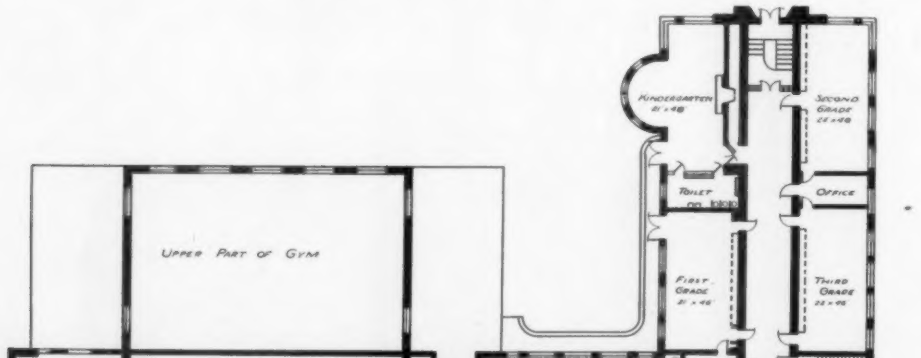
Basement Floor Plan

Heating, ventilating, lighting and plumbing facilities conform to modern standards in every respect. There are toilets and washrooms on every floor, with separate provisions for teachers, janitors and the public

ing, and two part-time directors of elementary teacher training. The bureau for teacher placement is also located in the building, and the director works in close cooperation with the staff of the school in the counseling and placement of student teachers.

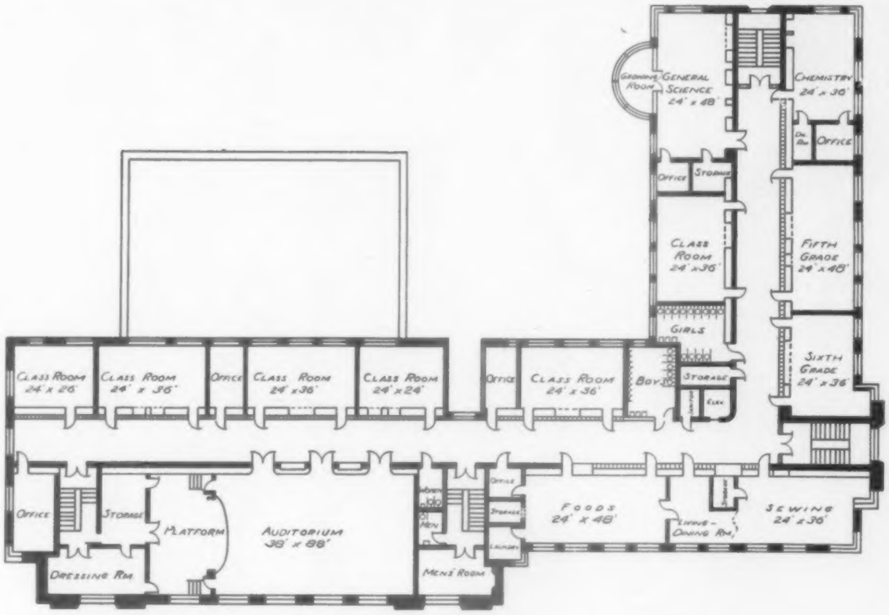
Planning the Building

Prior to the planning of the University School, a number of laboratory and demonstration schools of other universities and teachers colleges were visited and their facilities and programs carefully studied. In addition, modern standards for school buildings were analyzed and a number of modern public school buildings were visited to obtain information on the latest developments in schoolhouse planning. The educational needs of the local community and the requirements of the University program of teacher training were likewise given careful consideration. On the basis of these preliminary studies, the building was planned to provide a satisfactory environment for a modern educational program for the pupils and at the same time to provide adequate facilities for the training of elementary and secondary-school teachers, school supervisors, and administrators. In



First Floor Plan

Large storage rooms for supplies and instructional materials are readily accessible to all classrooms and laboratories



Second Floor Plan

Elementary classrooms are 48 x 22 feet, high-school classrooms are 36 x 22 feet, laboratories are 48 x 22 feet, and offices and workrooms for the staff and student teachers are 12 x 22 feet

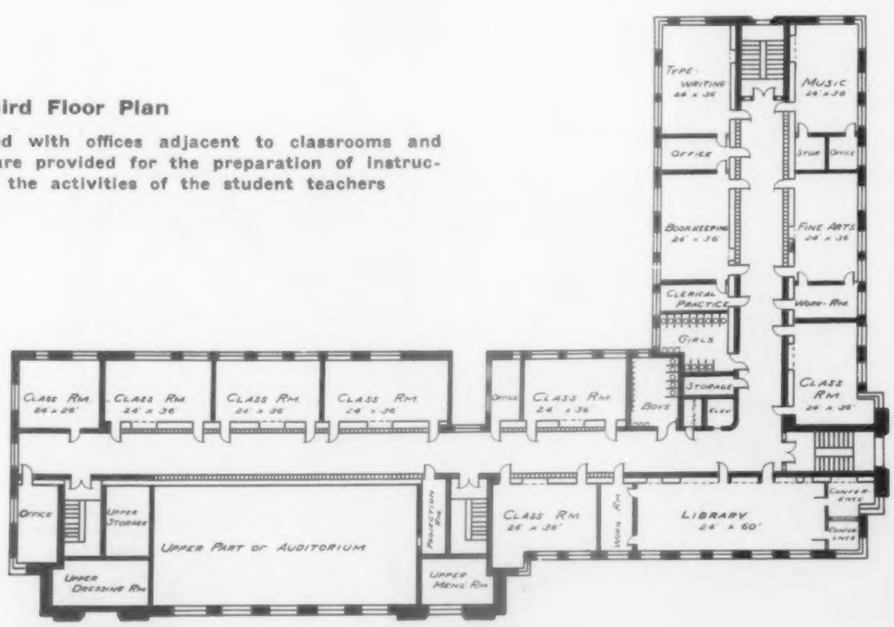
developing the plans, the architects endeavored to incorporate in the building all the special features which are necessary to successful achievement of the objectives of the school. In all important aspects the building was designed on a functional basis; the details of construction, arrangement of rooms, service facilities, decoration and equipment were planned in terms of the anticipated needs of the educational program.

Modern architectural design was selected for the building in the belief that this type of architecture is more adaptable to educational needs than are the traditional and classical types of architecture. The exterior is finished in Indiana limestone with a minimum of decoration. The exterior design is generally plain with emphasis on the horizontal lines and the arrangement of the windows, which gives the appearance of ribbons of light. This type of architecture provides maximum utilization of space with a high degree of flexibility at minimum construction costs. The natural beauty of the Indiana limestone is particularly adapted to this type of design. It gives the building a harmonious and dignified appearance and at the same time emphasizes its function. The use of masonry and steel throughout in the construction provides maximum safety and durability.

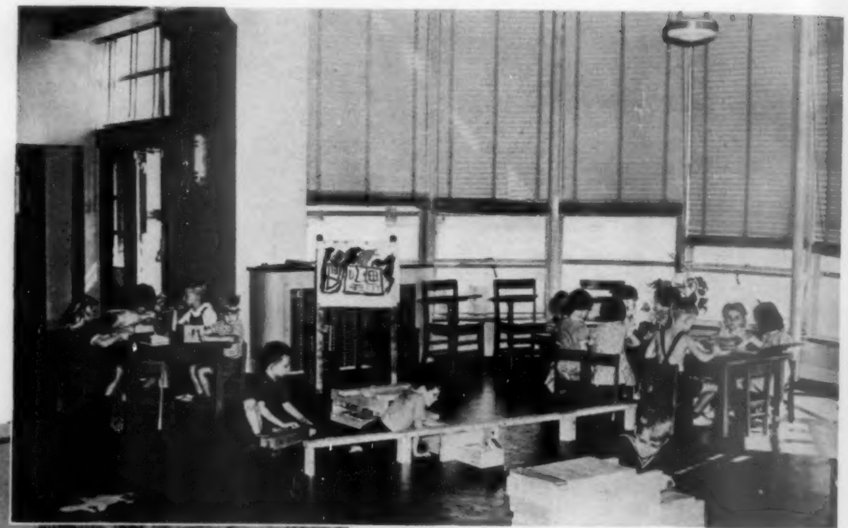
After considerable study of space needs the unit type of construction was selected. Each unit is 12 x 24 feet and is complete with respect to lighting, heating and ventilation. Space in the interior wall is

Third Floor Plan

Faculty members are provided with offices adjacent to classrooms and laboratories, and workrooms are provided for the preparation of instructional materials and for the activities of the student teachers



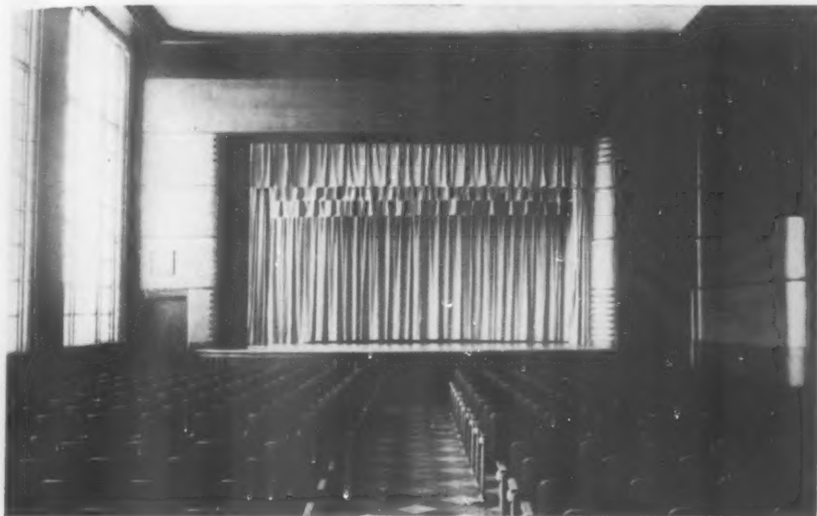
The spacious kindergarten is the most attractive unit in the school. Here children begin their school experience in an environment of beauty and adventurous activity



Elementary classrooms are well lighted and artistically decorated; movable furniture affords maximum flexibility in the use of room space

Built-in cases, bulletin boards, and ample storage space are provided in all classrooms and laboratories

The dignity and harmony of modern architecture characterize the main entrances to the building



The auditorium is in continuous use for dramatics, music, choral reading, and large-group activities. Numerous community and professional meetings are held in this room

Student teachers learn library management and gain experience in supervising study activities in the high school library. Each elementary class has its own library

Reading activities in the fifth grade. Elementary classes are often divided into several small groups engaging in different activities under the direction of student teachers, with other student teachers observing the work

A unit of work in junior high school social studies directed by a student teacher

available for built-in cases, lockers and cabinets, leaving a room width of 22 feet. This made it possible to provide rooms 12, 24, 36, and 48 feet long and 22 feet wide, as needed in the various instructional units. Since the spaces used for instruction are from 84 to 120 feet long, a high degree of flexibility in room arrangement was secured through this method of laying out the floor area.

Because of the dual use of the classrooms and laboratories, these rooms were made considerably larger than the typical public school classrooms. Elementary classrooms are 48 x 22 feet, high-school classrooms are 36 x 22 feet, laboratories are 48 x 22 feet, and offices and workrooms for the staff and student teachers are 12 x 22 feet. Rooms of these sizes provide adequate space for a modern activity program as well as for student teacher activities. It is not unusual for a class to be taught in two or three small groups, with a student teacher in charge of each and several other student teachers observing the activities in the room at the same time. This would not be possible in standard-size classrooms. In addition, faculty members are provided with offices adjacent to classrooms and laboratories, and workrooms are provided for the preparation of instructional materials and for the activities of the student teachers. Large storage rooms for supplies and instructional materials are readily accessible to all classrooms and laboratories.

High Standards Are Provided in Service Systems

Particular attention was given to the service systems. Heating, ventilating, lighting and plumbing facilities conform to modern standards in every respect. There are toilets and washrooms on every floor, with separate provisions for teachers, janitors and the public. All these rooms are well lighted and ventilated, and the fixtures are properly adapted to the varying sizes of pupils. The window area is equal to 27 per cent of the floor area in all rooms. Artificial lighting is semi-indirect, with an average of nearly 2 watts per square foot of floor area. Twelve-foot candles of artificial light are provided at desk-top height in all classrooms. The inner and outer rows of lights are on separate switches. The inner row of lighting fixtures is fitted with 300-watt lamps, and the outer row with 200-watt lamps, to compensate for the decreasing amount of daylight as distance from the windows increases. The windows are fitted with venetian blinds which give the maximum amount of natural light with elimination of glare. Several rooms have dark shades for visual education programs. All radiators are controlled with dual thermostats. All classrooms have unit ventilators and gravity exhaust. The gymnasium and auditorium are ventilated from a central fan, the air being brought in through an air washer.

Interior Decorations Emphasize Hygienic and Artistic Effects

In planning the interior decoration, efforts were made to avoid the dull monotony of typical classroom walls. Rooms with direct exposure to the sunlight are painted in soft, cool tones of blue and green, and rooms with north exposure are painted in a warm, sun-tone yellow to offset the lack of sunshine. In several rooms, such as the kindergarten, home economics and science laboratories, the interior decoration emphasizes the special use of the classroom. Corridor walls are painted a soft green and are finished with a cream-colored tile brick wainscot. The auditorium walls are finished with sapelia mahogany flex-wood with a paneled wainscot. Through careful selection of colors in terms of hygienic qualities and decorative effect, each room is made attractive and distinctive in appearance without violating any health or educational standard. It should be mentioned, too, that there was no excessive first cost of decoration nor any sacrifice of economy in maintenance.

The ceilings of corridors and classrooms are finished with acoustic tile to reduce noise and echo. It is felt that this is one of the most desirable features of the interior finish, for the elimination of noise reduces fatigue, improves attention, and aids materially in the orderly conduct of the school.

The corridor and classroom floors are surfaced with asphalt tile in colors to harmonize with the wall finishes. Battleship linoleum is used for the floors in science and home economics laboratories and in the kindergarten. The gymnasium and shop have maple floors laid over a concrete base. Toilets, shower rooms and dressing rooms have floors of terrazzo, which was also used for the stairs. The floors of the main entrances are finished with natural slate.

Furniture and Equipment Adapted to Purposes of the School

All classrooms and laboratories are furnished with built-in bookcases, storage cabinets and cork bulletin boards. The blackboards are fitted with adjustable rails for displaying maps, posters and similar types of instructional materials.

High-grade standard furniture and equipment were specified for all instructional units, offices and workrooms. Special or elaborate designs were avoided, since one of the objectives of the school is to demonstrate the proper use of standard equipment such as could be recommended for any public school where quality as well as economy is to be considered. Since the program of the school had to be developed from the beginning, it was possible to prepare specifications for furniture and equipment in terms of the actual needs of the school. Because of limitations of

The science laboratories are equipped with modern furniture, which permits multiple use of these units for all types of activities in physical and biological sciences

The art room serves all grades as a center for integrating art and craft activities with a wide variety of projects and units of work

The unit kitchens are equipped with gas, electric and oil stoves, and home-type furniture. A living-dining room and a laundry adjoin the kitchens, which, with a laboratory for sewing and design, complete the home-making unit

The high school pupils are given opportunities to improve their skills in a variety of activities in industrial arts and handicrafts

funds, the building was not completely furnished in the beginning. This was not considered to be a great handicap, however, for it was felt that many items could be properly selected only as the educational program developed and special needs became evident. During the past three years the original equipment has been supplemented by items the need for which grew out of the developing program and the specialized functions of the school.

All the classroom furniture is movable, and a variety of types of seating are provided to fit special needs or to demonstrate the advantages of each of the types. Primary classrooms are furnished with tables and chairs; intermediate and junior high-school classrooms have adjustable unit desks; and high-school classrooms are furnished with tablet arm chairs or chairs and tables. All classrooms have large reading and work tables for the pupils and seating facilities for observers.

During the period in which the school has been in operation considerable attention has been given to the special service areas. Materials and equipment for health service, physical education, art, music and guidance have been selected as the programs in these areas were developed. The library serves the dual purpose of pupil use and as a laboratory for the training of school librarians. Library books, equipment and materials have been selected to meet the needs of the dual program. The health service unit also serves as a practice center for training school nurses. A nursery school is planned for the future, and this unit will serve a variety of purposes in child-study, teacher-training, health and home-making courses. The cafeteria has not been operated, owing to lack of funds for equipment and operation. When equipped and operated, this unit will provide food service for the pupils and also will be used to demonstate good practice in the management of school cafeterias. These examples illustrate some of the more important ways in which the University School was designed and equipped to serve in the education of children and the training of school personnel.

Development of the University School Program

The University School is not designed or operated to demonstrate any radical innovation in education. A complete modern educational program is provided and some attention is given to experimentation, but the principal objective of the school is to demonstrate the type of program which might be adopted by any progressive public school system and to serve as a model for colleges and universities which are interested in a practical program of teacher training. The flexibility of the building and equipment makes possible adjustments in the program as conditions and needs change.

The extent of the program of the University School is well illustrated by some facts from recent surveys of the activities centered in the school. In addition to serving the needs of nearly 700 pupils enrolled and approximately 200 student teachers assigned for observation and practice teaching, the school entertains large numbers of visitors who come to observe the various activities. During the past school year 46 research and experimental projects were carried on in the school by members of the school staff and the University faculty. The building and equipment have proved to be adequate and appropriate in all important aspects for the varied demands of this extensive program.

As originally planned, one wing of the building was to provide offices and classrooms for the School of Education faculty. This arrangement would have brought together all the activities of the University in training school personnel in one building. Owing to lack of funds this wing was omitted. It is hoped that this unit may be added in the future.

Construction Costs

The building was financed as a PWA project. The construction costs and architects' fees were approximately $655,000. Furniture, laboratory equipment, instructional apparatus and library books totaled $43,140. These costs, together with necessary purchases of land, connections to University service facilities, etc., brought the total expenditure for the completed project to $776,900. Since completion, approximately $5,000 has been spent for additional equipment and instructional materials. The unit cost for constructing the building was approximately 38 cents per cubic foot, which is the lowest cost among the buildings constructed under PWA at Indiana University.

With this modern school plant, Indiana University is in a position to give increased service to public education in Indiana and to develop a teacher education program which will rank high among the teacher training institutions of the United States.

PLANNING SCHOOLS WITH A VIEW TO HIGH-LEVEL DAYLIGHT ILLUMINATION IN EVERY CLASSROOM

By LELAND H. BROWN

Assistant Professor of Electrical Engineering, Stanford University

SCHOOLHOUSE planning in the United States has gone through quite a process of evolution. The great importance of education was early realized, and each tiny community had its proverbial little red schoolhouse. As the community grew and prospered, it built larger and more pretentious schools, emphasis being put upon the appearance of the building; thus schools became monuments of civic pride. The results were at times tragic for the teachers and students who used them; architectural triumphs from the outside, with cold, dark, prison-like interiors that were anything but conducive to teaching and studying.

Fortunately, schoolhouse planning has been revolutionized with the realization that school is an environment for learning, and should be built to be as effective an environment as possible. Psychologists have found that the average person acquires over 85 per cent of his knowledge through the sense of sight; so a modern progressive schoolhouse architect now designs his schools to provide an optimum environment for easy, effective seeing.

Factors That Affect Seeing

The creation of a schoolroom for easy seeing is not as simple as it might at first seem, for there are so many factors that affect seeing that one may easily become bewildered by their multiplicity. Probably the most complete treatise on the subject is "The Science of Seeing,"[1] in which the interested reader will find a wealth of factual and quantitative scientific data on the subject. Fortunately, the main requirements are few; easy seeing will result if good-quality, well-diffused light of ample quantity for the most difficult seeing tasks is provided, and if in addition the surroundings are properly conditioned for comfort.

Studies by Dates have shown that the seeing tasks encountered in average classrooms vary over a very wide range. Thus 8 point Bodoni type printed on good white paper can be easily read under an illumination of 10 footcandles. Ink notes on average school notepaper require about 25 footcandles to be as easily read; pencil notes, 50 footcandles; and fine print on colored maps may need as much as 200 footcandles of illumination before it is as easy to read as the 8 point type on white paper under 10 footcandles. Dictionaries are another example of difficult seeing tasks, for the fine-type print in many of them requires 80 footcandles or more for satisfactory seeing.

The illumination in a classroom should be high enough to be adequate for the hardest seeing tasks encountered in the room. The eye has incorporated in it compensating protective equipment so that high illumination on an easy seeing task merely results in faster, easier and more distinct seeing. On the other hand, there is nothing in the human eye that can compensate for insufficient illumination, and unfortunately the eye will undertake any and all seeing tasks it encounters, even though it may strain itself in the attempt. Of course there is an upper limit as to the permissible amount of illumination on a seeing task, but it is in the thousands of footcandles, and hence need not be considered here, except to mention in passing that direct sunlight on a seeing task will produce such levels, and so it should not be countenanced in a classroom. The ideal illumination seems to be light of the quantity and quality found under the shade of a large tree in summer—about 500 footcandles of well-diffused daylight. In view of this fact, it seems quite reasonable to set 100 footcandles as the desirable illumination in every classroom.

Actual tests in average schools throughout the country show the appalling fact that desks next to the inner wall of the room often have only 1 to 5 footcandles of illumination, owing to daylight; and turning on the artificial lights in the room will rarely raise the illumination above 10 footcandles. This is the reason why schoolhouse designers have often raised their hands in horror at suggestions that they provide even 25 footcandles of average illumination in classrooms. They only visualized providing this light by artificial means, and the amount of power necessary to produce such illumination in the old-style inefficient schoolrooms was considerable. Consequently, the advocate of high-level illumination was accused of being a tool of the electric power industry. The seriousness of the situation is evidenced by the fact that a national organization of schoolhouse planners went on record in 1939 as opposing the 20-footcandle classroom lighting recommendation in the 1938 revision of the American Recommended Practice of School Light-

[1] By Matthew Luckiesh and Frank K. Moss. D. Van Nostrand Co., Inc., New York. 1937.

ing, and favoring the retention of the lower levels of illumination recommended in the earlier edition.

A few school designers, however, notably Dr. Bursch of the California State Division of Schoolhouse Planning, determined to find some way to economically provide high-level illumination in classrooms. Since class hours for the majority of schools in the United States are from 9 A.M. to 4 P.M., and the art of illumination with artificial light had not progressed to the point where high-level illumination could be cheaply provided by electric power, these designers decided to see what could be accomplished by designing classrooms for high daylight illumination. The results, while admittedly not perfect, have been most gratifying.

Design Factors

Location of Seeing Tasks

A study of the seeing tasks in the schoolroom shows that the most critical seeing, and the greatest amount of seeing, is done at the desks with material placed on the desk tops. Therefore, the illumination on the horizontal plane at desk height is the most important illumination in the classroom. However, books are usually held in the pupils' hands while being read, and a fair amount of seeing material is placed on chalkboards and pinning-boards, so that the illumination on the vertical planes throughout the room is also important. Lastly, the lighting problem is further complicated by the informal seating arrangement used so often in modern teaching. This informality requires that well-diffused light be provided on the working plane of the desk, regardless of the orientation of the desk in the room.

Admission of Daylight

Daylight can best be introduced into a classroom by means of a window or some similar form of glass panel. Since the illumination on the horizontal plane is of prime interest, the glass panel should be located for the most efficient illumination of the horizontal plane. This is achieved when the projected area of the glass panel on the plane in question is a maximum. Thus, Fig. 1 shows the cross-section of a hemisphere which represents the walls and ceiling of a classroom, with its base representing the horizontal working plane of the room. Equal-sized windows are represented in cross section by *a-b* and *m-n,* one located at the top of the room and the other low down on the side. The corresponding projections of these windows on the working plane are *a′-b′* and *m′-n′*. From this it is evident that glass area at the top of the room is the most effective for lighting the horizontal working plane, and glass area on the side of a room is the least effective. Ceiling windows, that is, skylights, should therefore be the best for classroom lighting from the point of efficiency of light admission alone.

Actual installations have shown this to be the case, and at Hanford, Calif., two schools have been built with north-facing skylights built into the ceiling. The elaborate ceiling structure made the cost of these classrooms fairly high, and such construction in snow areas would be of questionable value. A more serious drawback from the lighting standpoint is the fact that no skylight design has as yet been devised that will light the surrounding ceiling to a brightness comparable with that of the skylight. The brightness contrast between the skylight and the adjacent ceiling is so excessive that it is very uncomfortable for anyone facing the skylight. A possible solution would be to make the entire ceiling luminous, but cost considerations prohibit such construction at the present time.

Side windows are therefore the alternative. Referring again to Fig. 1, one will note that a square foot of glass at the top of a window will be several times as effective in lighting a desk as a square foot of glass at the bottom of a window. This is a fact that is not usually appreciated, for too often window-shades are mounted at the top of the window so that the valuable top light is the first to be cut off when the shades are drawn, even partially. Again, when double-hung shades are available, teachers too often draw the top shade and leave the bottom of the window unshaded. Reversing the practice and keeping the top of the window unshaded would admit several times more light into the room and also more effectively direct the light onto the ceiling, from which it would be diffusely reflected, thus lighting the entire room. Similarly, awnings and curtains mounted outside at the top of a window are very detrimental to the room illumination. Efficient window design calls for windows running clear up to the ceiling with the glass line extending as close to the ceiling as possible. To achieve uniform illumination, the glass area should

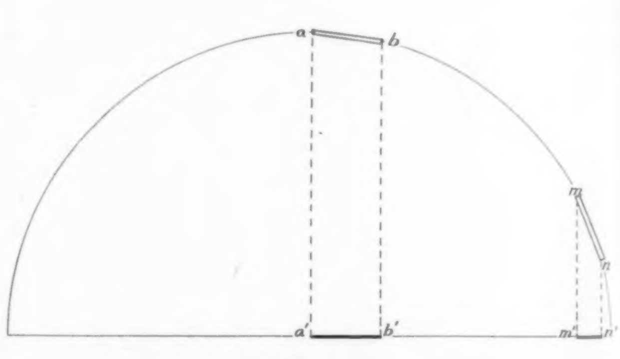


Fig. 1

The efficiency of a window in lighting a horizontal plane is proportional to the projected area of the window on that plane. In a schoolroom, therefore, the higher up the windows admit light, the more effective they will be in lighting the desk tops

be as large as possible, indicating the necessity of using narrow window-sash and mullions.

Bilateral Lighting

The illumination due to daylight naturally decreases as one moves back from a window. As a result, desks along the inner blank wall of a classroom may have only a small fraction of the illumination on the desks next to the windows. The logical solution to this problem is to place windows on the inner wall as well. This again brings up the subject of bilateral lighting, which was discarded years ago because of the objectional cross-shadows it produced. Most children are right-handed, and it is desirable that the directional component of the light in the room come from the left, so that when writing the pencil shadow will be cast on the right-hand side. Louvers should therefore be placed over the windows on the right-hand side of the room so as to direct the light to the ceiling, from which it will be diffused over the room without interfering with the primary light from the left.

Ceiling

There has been a considerable amount of experimentation with sloping ceilings for light control in classrooms. It is claimed that they intercept light and direct it down onto the desks, thus giving an even distribution of light throughout the classroom.[2] It is universally conceded today that a flat white, or one that is just off white, is the best ceiling finish. Such a ceiling is a diffuse reflecting surface which follows fairly closely the cosine law of reflection. Consequently, the maximum amount of light is reflected perpendicular to the ceiling, regardless of the direction in which the light strikes the ceiling (see Fig. 2a). Theoretically, a ceiling that slopes from the windows on the left down to the wall on the right introduces a directional component of light to the left. A horizontal ceiling reflects the maximum amount of light straight down; and a ceiling that slopes from right to left directs more of its light to the right (see Figs. 2b and 2c). Practically, the directionality of light from such ceilings is so small that there is little choice between them. On the other hand, a sloping ceiling does make the lighting of the room with artificial light more difficult, and often is more expensive to construct than a horizontal ceiling, so the latter is to be preferred. The real reason that rooms with sloping ceilings are better lighted in most cases is that the windows run up higher on the high side of the room and thus admit more top light into the room.

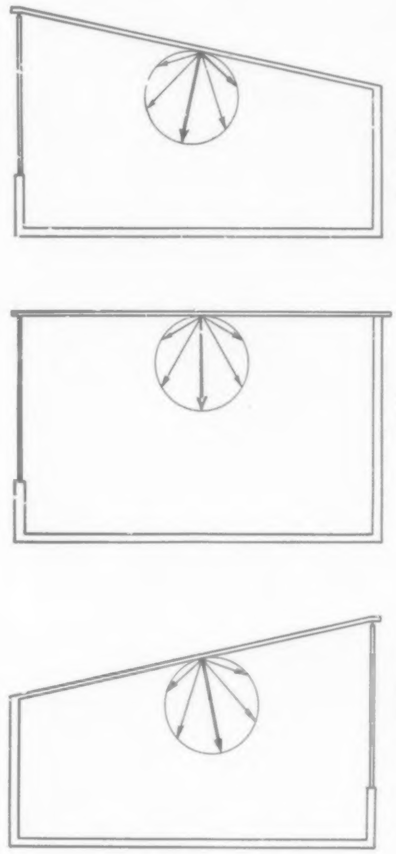
Surroundings

Experiments have proved that illuminating the seeing task to a high brightness is by no means the whole

[2] THE AMERICAN SCHOOL AND UNIVERSITY, 1941; page 36.

Fig. 2

The pattern of the light rays reflected from a matte surface ceiling is a circle that is tangent to the ceiling regardless of the initial direction of the incident light



2a. A ceiling sloping down from left to right reflects maximum light to the left

2b. A horizontal ceiling reflects maximum light downward

2c. A ceiling sloping down from right to left reflects maximum light to the right

problem in lighting for effective seeing. It is equally important to suitably light the area around the seeing task and to have its brightness properly proportioned, good study conditions are to be achieved.

Results of careful tests have shown that seeing is easiest when the brightness of the background is the same as that of the seeing task. On the other hand, a person's attention was found to be held to the seeing task better if it was brighter than the background. Consequently, optimum study conditions are realized when the seeing task is about twice as bright as its background. Quantitatively, this means that if the illumination on a child's book on his desk is 100 footcandles, and the book is printed on white paper having a reflection factor of 80 per cent, the brightness of the book will be 80 per cent times 100, or 80 foot-lamberts. For most effective study conditions, the desk top should therefore be one-half of this brightness, or 40 foot-lamberts. Unfortunately, the average desks are stained a "good serviceable dark color" which reflects about 10 per cent of the light. The brightness of such desks will therefore be 10 per cent of 100, or 10 foot-lamberts for the case under

consideration. Desk tops should have about a 40 per cent reflection factor for good study conditions.

Similarly, the dark wall paints that "won't show the dirt" are taboo if a room is to be designed for easy seeing. The design outlined above for daylight illumination requires that the ceiling be a diffuse reflector to distribute the light from the windows over the entire room, hence it should be as light as possible. Incidentally, a light ceiling also relieves fixture brightness contrasts, and improves the illumination from all artificial lighting systems. Therefore, whenever a dark ceiling is used, it is an indication that the designer has sacrificed seeing comfort for some other feature; and the taking of such a liberty in a regular classroom is inexcusable. The upper walls of a classroom should also reflect well over half of the light that strikes them. However, they are more in the field of vision of the pupils and so need not be as bright as the ceiling. The lower walls are directly in the pupils' line of sight whenever they look up from the desk and consequently should have a moderately low reflection factor.

Chalkboards

Chalkboards have for years been a seeing hazard in schoolrooms. Every effort has been made to make them as dark as possible so that the white chalk marks will contrast well with the board and thus make the blackboard an easy seeing task. This concern in making the chalkboard as easy a seeing task as possible has resulted in large areas of dark surroundings in the classroom, with detrimental effect on all the other seeing done in the room. Actually, modern teaching uses the chalkboard at most only an hour or so a day. Therefore, a lighter chalkboard is preferable, admittedly making it a more difficult seeing task, so as to provide less severe brightness contrasts in the room for all the other seeing tasks.

Glossy surface chalkboards have in many states seriously modified the design of classrooms. Window reflections from such boards produced glare spots that so effectively masked the writing on the boards that several state school-building codes require blank side walls for a distance of 8 to 10 feet from the front wall of the room. Thus, by putting the blackboard in relative darkness, reflections from the board are avoided but only at the expense of making the blackboard a difficult seeing task and creating a still blacker area at the front of the room, thus adding to the discomfort of all seeing done in the room.

The solution of the entire chalkboard problem is to use a fairly light board, one that is only a little darker than the adjacent wall area, and then provide a large window area clear to the front wall of the room so as to illuminate the board to a reasonably high brightness, with light so directed that board reflections will not be visible from the desks even if the chalkboard should become glossy with use.

Outdoor Brightness

A much more serious problem in natural lighting is the excessively high brightness of the sky and adjacent buildings as seen through classroom windows, often in juxtaposition to a very dark chalkboard. Measurements show that the brightness of a clear blue sky may well be 1,000 foot-lamberts or more, and clouds often have brightness of over 2,000 foot-lamberts. Similarly, sunshine on a light-colored building may give it a brightness of several thousand foot-lamberts. Blackboards, on the other hand, in average classrooms, often have brightnesses of only one or two foot-lamberts. For comfortable seeing, the range in the brightness of objects in a person's view should not exceed 100 to 1. In addition, tests have proved that the main seeing task should be brighter than the surroundings. From these facts it is at once apparent that provision must be made to shield the high outdoor brightnesses from the view of the children. This can probably best be done by covering the windows with slatted shades, venetian blinds, or similar window louvering devices that will reflect light to the ceiling and at the same time cut off the outdoor view for anyone seated at a desk in the room.

Many schoolhouse designers have the mistaken belief that children must be able to look outdoors from their classrooms so as to "rest their eyes." The human eye, however, is in a relaxed position when it focuses on objects 20 feet or more away. Consequently, the average size classroom of 23 by 35 or 40 feet is large enough to afford eye relaxation without the need of a view outdoors. The louvering of the windows, besides reducing the brightness contrasts in the room, has the added advantage of cutting out all view of passing distractions,* thus creating a more studious atmosphere.

Specifications for High-Level Daylight Illumination

From the above it follows that a school can readily be designed so as to be an environment really conducive to learning if all the classrooms are built for high-level daylight illumination and thus afford the children easy, comfortable seeing. In the light of best present-day practice the construction of such classrooms would be about as follows for classes of, say, 30 pupils per room:

The length would be 40 feet, width 23 feet, height 15 feet, with a horizontal ceiling. Windows would constitute much of the wall space on both sides of the room, and they would extend the entire length of the room. The windows on the left-hand side would start 3 feet 6 inches from the floor and extend clear

to the ceiling. They would provide the primary light for the room and should preferably face north where the most even sky light is found. Second choice would be to face the windows east.

Secondary light for the room would be provided by the windows on the right-hand side which would start 8 feet from the floor and extend clear to the ceiling. Steel sash and narrow pipe mullions would be used throughout so as to permit the glass to constitute as much of the window area as possible.

All the windows in the room would be shielded with louvers of minimum thickness having a reflection factor of 80 per cent or better on their top surface and about 65 per cent on the lower surface. The louvers over the right-hand windows would be fixed in position so as to reflect a maximum amount of light to the ceiling and to just cut off all view from the sky for a person standing anywhere in the room. Fixed louvers would be used for these windows so that it would be impossible for anyone to get them in improper adjustment. Naturally, there would be provision to swing the louvers away from the windows for cleaning them. The louvers on the left-hand side of the room would have the lower 8 feet set in the fixed position that barely cuts off all view of the outside for a pupil sitting at a desk anywhere in the room. The upper 3½ feet of these louvers would be made adjustable so that they could be set anywhere from bare cut-off for the seated pupil, to a horizontal position. It should be impossible to tilt the window louvers downward past the horizontal, for this would permit a direct viewing of the sky through the louvers and thus defeat their purpose. The adjustable upper 3½ feet of the window louvers on the left-hand side of the room is suggested, so that on dark winter days the louvers may be turned to the horizontal position to admit more top light into the room. This light will be admitted so high in the room that the children's eyebrows will shield their eyes to a great extent from the strips of sky exposed by the horizontal louvers, and thus the seeing conditions in the room will still be quite comfortable. It is also desirable that it be impossible to raise these louvers from the bottom, like venetian blinds. Experience has shown that whenever such an adjustment is provided, someone will raise the louvers and uncover the bottom or perhaps all of the window. Busy teachers may not think to remedy the situation, and so a class may have high brightnesses inflicted on it for days or even months.

The ceiling of the room would be a flat matte finish that was just off white in color and would have a reflection factor of 80 per cent or more. The walls would be finished in an egg-shell or semi-gloss paint. The area above the chalkboard should have a reflection factor of 65 per cent, the chalkboard 20 per cent, the pinning-board 50 per cent, and the walls below the boards 50 per cent. The trim in the room would be a semi-gloss finish with a reflection factor of 35 per cent, and the floors would be in a dull finish with about a 10 per cent reflection factor. The choice of colors used in the room is optional, provided they harmonize. Warm colors might be desirable in cold climates, but the cooler, more cheerful greens and blues would probably be preferable for most places. The desks would be light in color, the tops finished in "blond woods" or even in light linoleum if the children are old enough to give them proper care.

An indirect artificial lighting system would be provided to supplement the daylight on dark winter days and to light the classrooms for occasional night use. The artificial light would primarily supplement the natural light and hence would only need to supply about 20 footcandles. Eight 500-watt luminaires using silver bowl lamps would probably be the present choice. When the initial price of low brightness fluorescent lighting fixtures becomes lower, they may well be the logical choice. Most of the present fixtures that are moderate in price expose naked fluorescent lamps to the view of the user. The naked fluorescent lamp has a brightness around 2,000 foot-lamberts, almost ten times the brightness considered acceptable for good school lighting practice, so that it is not very serviceable for school use.

The problem of providing high-level illumination in all school classrooms is therefore seen to be relatively simple. First, the rooms must be designed to admit a large amount of daylight so controlled that an ample quantity of well-diffused light is directed onto the seeing tasks throughout the room. Second, outdoor scenes must be louvered from view,* and the interior decorations must be such that high-brightness contrasts are eliminated and comfortable backgrounds provided for the seeing tasks.

* The editors are in disagreement with this idea of shutting off the view from the classroom. They desire, however, to give the author the opportunity to present his point of view.

CROW ISLAND SCHOOL—IN WINNETKA

The Superintendent of Schools,

CARLETON WASHBURNE,

discusses the planning of a modern school building to fit the lives children live within it

MOST school buildings of the present perpetuate in brick and steel a type of education which is dying out, and cramp and hinder the new education that is coming in its place.

The old concept of education was to force unwilling children to sit still, keep quiet, and do as they were told. Thus admonished, they were force-fed book learning of a type that adults considered good for them. School buildings for these purposes had to provide space for even rows of desks, wall space for blackboards, good light, fresh air, and safety from fire hazards. They also had to provide adequate sanitary facilities, and since few traditional schools are exclusively academic, they usually provided an assembly hall and a gymnasium and sometimes various other appurtenances. But their box-like rigidity, the unimaginative sameness of the classrooms, ranged on two sides of the corridor in neat rectangles of 22 feet by 30 feet with 12-foot ceiling, primary grades below, upper grades above, are almost the universal architectural concept of a school. Trimmings differ, but the underlying pattern has an amazing sameness throughout the United States.

But the new education is built around children's lives, active, imaginative, expressive lives, the lives of future citizens of a democracy. It recognizes that these lives must be healthy both physically and emotionally. It is concerned with the child's happiness in school as well as out. It does not lose sight of the need for the three R's and for sound knowledge, but recognizes that this need is met much more efficiently if the child's interest is captured and he applies himself to his work with zest.

A school to embody this newer type of philosophy has been constructed in Winnetka, a school which begins with the kind of lives the children live in a modern school and makes a building to fit these lives. It is the Crow Island School, a public elementary school for children from four years of age to twelve. Its construction is simple and modern, and its cost no greater than that of any good, modern, fireproof, box-type of building with equal facilities.

Crow Island is an example of democracy in a constructive enterprise. It is not the concept of any one person, but the result of the coordinated thinking of children, teachers, supervisors, principals, janitors, School Board members, parents, school superintendent, engineers, and architects.

The Planning

Like every subsequent detail, the selection of the architects was the result of long and careful planning. It was at the suggestion of Robert S. Hammond, President of the Board of Education, that the Winnetka School Board did an unusual thing. It decided to engage the architects and begin planning several years before actual construction was contemplated.

Winnetka was determined to do the best possible job in planning a school to fit its educational philosophy, a philosophy which was the result of twenty-two years of practical research and continuous exchange of experience with educators in this country and abroad.

The selection of architects was a joint responsibility of the Board of Education and the Superintendent of Schools. A wide search was made. Finally we hit on a rare combination—a young firm of architects, Perkins, Wheeler & Will, eager to give detailed study to our needs, and a firm consisting of one of the world's greatest architects and his son, Eliel and Eero Saarinen.

The Saarinens, of Bloomfield Hills, Mich., had built the Cranbrook and Kingswood Schools, and when members of the Board of Education saw Kingswood particularly, its beauty gave them a vision of what a school might be. Saarinen's world-wide reputation and the magnificent designs of his buildings gave the Board complete confidence in his ability to do an outstanding job.

The other firm was headed by Lawrence Perkins, the son of Dwight Perkins, long known as one of America's leading school architects, and the senior partner of the firm that had built two of Winnetka's schools. Dwight Perkins was now connected with his son's firm as a consultant. With Lawrence Perkins were two highly trained and able young men, Todd Wheeler and Philip Will, Jr. Since it was through Mr. Perkins that our Board made its arrangement

with the Saarinens, there was no difficulty in arranging a partnership between the two firms, the Saarinens to be especially responsible for the general design of the building, its form and mass and the colors and materials to be used throughout; Perkins, Wheeler and Will for studying the needs of the school, working closely with the staff and the School Board, and coordinating their ideas into a functional plan. The latter firm were responsible too for the supervision of the actual building while under construction. This combination worked out admirably.

Lawrence Perkins immediately began to study the Winnetka Schools. He spent most of his time for three months visiting classes, studying the educational philosophy of the Winnetka Schools, and conferring with members of the staff. He then prepared a preliminary sketch of a classroom unit that would be suited to the various kinds of activities that went on in a Winnetka schoolroom—the children gathered about the teacher for story-telling, the children building Indian pueblos or Egyptian temples or Dutch windmills large enough to play in, the children seated quietly at their desks studying, the children at work on construction, or cooking, or doing science experiments, a group wanting to get off to one side for quiet study, a group raising pets or making a garden, and so on. He submitted his preliminary sketch to the teachers in each of the Winnetka elementary schools for their criticisms and suggestions. Winnetka teachers are accustomed to democratic participation in all things having to do with their work, so they were very free with their ideas.

The Spirit of the Building

It was one of the Winnetka staff, Frances Presler, Director of Group and Creative Activities, who wrote to the architects: "Now that I have seen the interior of buildings that you have made and seen that you can build specific spirit with landscape, brick, wood, metal, glass and textile; with shapes and masses and strips of color, may I share with you my thoughts and feelings of what our school building should really be?

"All the architecture should be a setting for child life. The building itself should be the place of joy in living. It must be a place which permits the joy of small things in life and in democratic living.

"The building must not be too beautiful, lest it be a place for children to keep and not one for them

Hedrich-Blessing Photos

This is the project corner of the Winnetka unit classroom. The formica-topped tables stand endless abuse. Walls of pine planking support childish murals and important study materials

to use. The finish and settings must form harmonious background for honest child effort and creation—not one which will make children's work seem crude.

"Above all, the school must be childlike—not what adults think is childlike. It must be a place for living, a place for use—good hard use—for it is to be the home for successive groups of children, a procession of thousands of children through the years. It must be warm, personal and intimate. To each of these thousands it must be 'my school'.

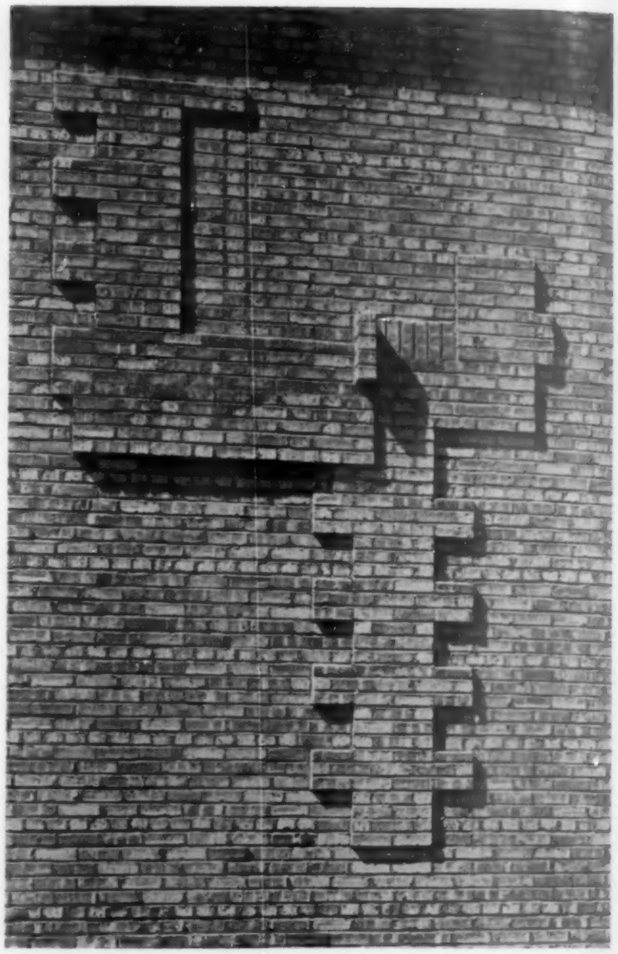
"It must be democratic—that above all is necessary. Our school will look out upon a democracy of homes: some beautiful ones of the privileged; some modest ones; some unpretentious ones of a struggling foreign group. The children of these homes must feel unity between their school and home life."

The outcome of all this planning is the Crow Island School, a building which encourages spontaneity, initiative, creative work, and independent thinking. It consists of a central section for all children, a wing for the nursery school and kindergarten children, another for the primary children, and a third for the children in grades three to six.

Design of the Building

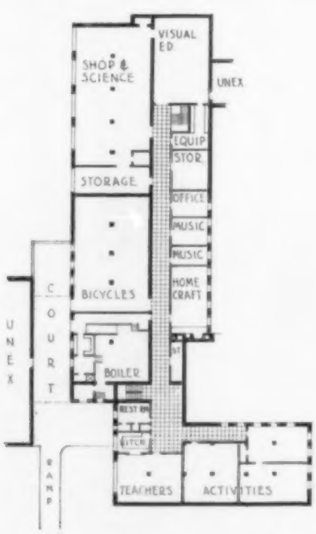
The classroom unit, the most characteristic part of the building, is L-shaped, consisting of a main part 22 by 32, with an ante-room 12 by 16. Embraced within the angle is a small yard or outdoor classroom that belongs to the children of this particular room.

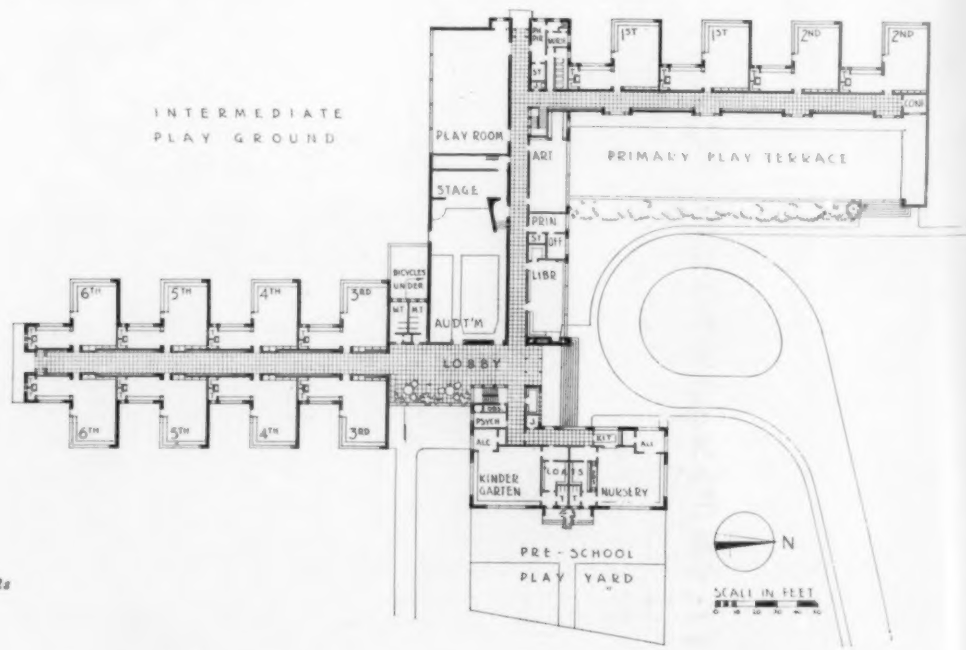
The main room has windows on two sides, to the south overlooking the little yard and to the east or west as the case may be. These windows extend from the window-seat to the ceiling and constitute two walls of the room. The ceilings are lower than in most



Above—Winnetka's children first learn to associate an architect's plan with an actual building from this detailed brick plan of Crow Island School on the south wall of the assembly room

Below—Basement and main floor plans of the Crow Island School

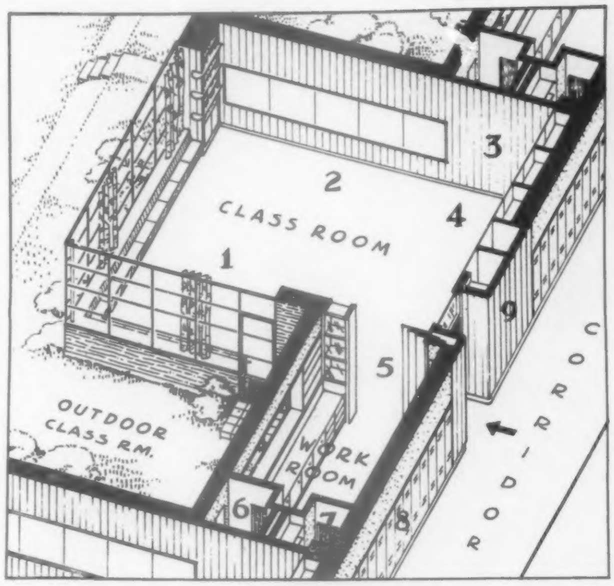




Eliel and Eero Saarinen and Perkins, Wheeler and Will, Architects

(Right)

1. Windows covering almost two sides give the classroom maximum sunshine and air, welding it almost into a unit with the out-of-doors. At the juncture of the two glass windows is the story corner.
2. Informality and flexibility of arrangements reign in the desk area of the classroom. Tables and chairs for the primary grades, unit desks for the intermediate grades, were all designed by the architects in collaboration with the superintendent of schools.
3. From floor to ceiling, the walls are covered with natural finish western pine. Progressive education uses many classroom aids, pictures, maps, magazine covers, drawings by children. These may be freely mounted in any quantity on wall surfaces in the classroom or outside at 9.
4. In the project area one may find the tent of the Hopi Indian, a bank, a post office, or a Viking ship, depending on the grade of the class.
5. Sliding doors separate the classroom proper from its own workroom. Both have ample cupboard and drawer space, the latter a large, well-lighted bench area. For privacy or conference, the doors may be closed. Normally they are open as part of the entire class.
6. Every classroom has its own washroom-toilet. They are graded in size from nursery school to sixth grade.
7. Boys and girls use the same washroom until fifth grade. In the sixth grade they use separate facilities.
8. Flush corridor lockers.
9. Walls of western pine in the hallway serve as bulletin boards.



Crow Island Classroom Unit

classrooms—nine feet, as in homes. The walls are of soft pine in a natural finish, and children's work can be thumbtacked into them freely without harm. One wall consists entirely of cupboards from floor to ceiling, for adequate storage of the many materials used in a modern school.

The ante-room extends southward from the classroom and can be closed off from it by folding doors. On one side is a wide work-bench, extending the length of the ante-room and overlooking the little yard. Below the work-bench is additional storage space. The bench is equipped with gas, and electricity for science, cooking, or wood work. At the far end of the ante-room is a sink with a drinking fountain and an individual toilet belonging to this classroom exclusively.

The play yard is divided approximately into two parts diagonally, the shady part being covered with

This west elevation reveals the series of unit classrooms, each classroom complete in itself with its own outdoor play yard. The simple, functional lines of Crow Island's exterior are in sharp contrast to the warm, natural pine walls and the brilliant colors of the interior

flagstones for an outdoor classroom or a place where children can build a house for pets or a playhouse. The sunnier triangle is a garden or a lawn, a place for vegetables, or flowers, as the children and teacher may decide. The children may enter their classroom through their own little yard or through the main corridor.

These classroom units are strung together along a corridor which leads to the central section of the building. Here, in the central section, are located the assembly hall, the playroom, the nurse's office and rest room, the art room, principal's office, and library.

Under the center section there is a basement, in which there are a room for visual education, a couple of offices and workshops for faculty members, two studios for lessons in instrumental music, a shop and science room, a room for the children's bicycles, a teachers' rest room, kitchen, and lounge, and the "pioneer room."

The "pioneer room" is a room fitted up like the interior of an early American home. Here, with churn, spice grinders, old-fashioned waffle-iron, candle-molds, spinning wheel, trundle-bed, and so on, children may relive the lives of the early Americans who made our country. This room is used not only for the Crow Island School, but for groups of children from all the other schools in Winnetka whenever they are studying pioneer life.

Crow Island School is an architectural expression of an educational philosophy. Instead of setting the educational pattern by its traditional form, it is an outgrowth of a new and broader type of education and gives that education scope.

And it has great beauty—the simple beauty of good lines, bright color, and the expression of children's living. Because it was planned in close cooperation with teachers who are in daily contact with live youngsters and who have high ideals for these children, it is a school to be lived in—another home.

The Architect,

LAWRENCE B. PERKINS,*

discusses the design and structural features of the Crow Island School, an architectural expression of Winnetka's educational philosophy

THE Crow Island School is not the traditional box-like building which has characterized most schoolhouse architecture of the past; instead, it is a family of individual classrooms, designed to help, not hinder, the individual development of children who are learning by doing.

Elsewhere in these pages Carleton Washburne, Superintendent of the Winnetka, Ill., schools, tells of the tradition-flouting preliminary steps which led up to the design of the Crow Island School: the years of study and planning which went on before even a site was selected; the virtual enrolment of the architects in the children's classes—a return to school for a study of children's needs; the canvassing of students, teachers, janitors for their ideas as to what the ideal school should contain. It was the task of the architect, then, to fit brick and concrete and glass and steel and wood to Winnetka's children and Winnetka's educational philosophy—not to tailor the building to tradition.

The Crow Island School is a native brick, flat-roofed, one-story structure built to harmonize with the flat landscape of the Skokie valley, on the edge of which it is situated.

Highest tribute must be paid to the genius of Eliel and Eero Saarinen, the world-famed architects with whom it was the good fortune of Perkins, Wheeler and Will to collaborate. Their mastery is evident from the broad concept—the mass, form, color—down to such details as the irregular auditorium stage and specially designed plywood furniture.

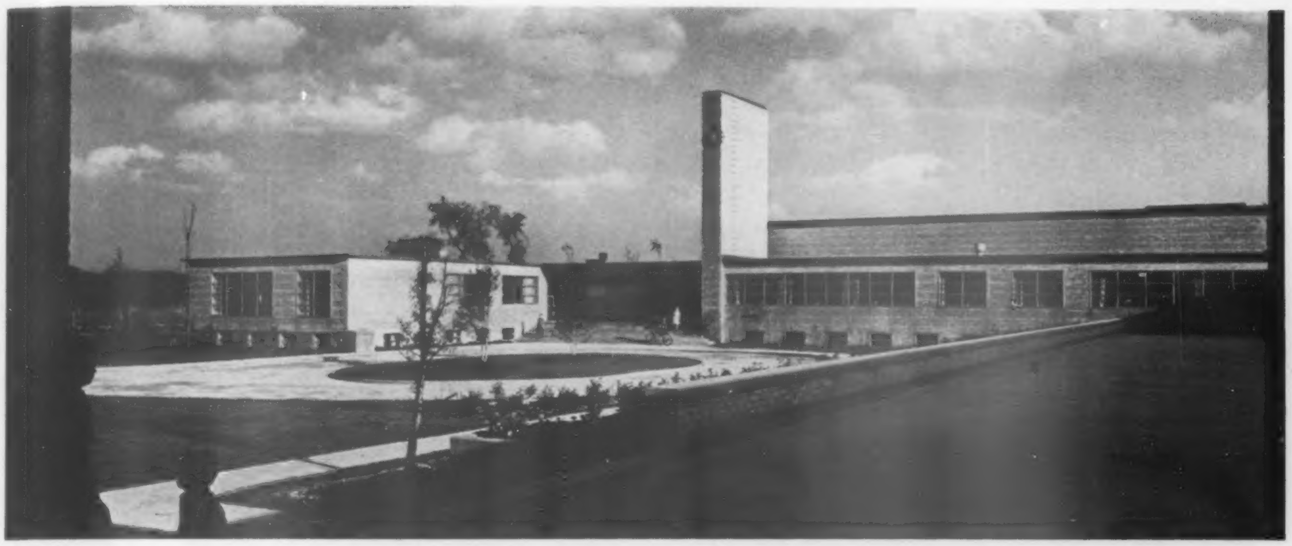
Three wings—for kindergarten, primary, and intermediate students up to the sixth grade—are grouped around central community facilities which include office, art rooms, playroom-gymnasium, library, health room, and auditorium.

The Unit Classrooms

The wings themselves are composed of unit classrooms—the principal contribution of the Crow Island School to education. Each of the 14 classrooms is L-shaped, the main part of the room being 22 x 32, with an adjoining workroom for each class measuring 12 x 16. This workroom can be separated from the main classroom by sliding doors. Its work-bench overlooks the play yard, is equipped with gas and electric outlets for cooking and science, tools for woodworking, and commodious cabinets for the many projects of the progressive pupil.

The general idea of each classroom unit is that it should be like a cottage school—each classroom a self-contained home unit, with its own workroom, washroom, project area, story corner, and outdoor

* Perkins, Wheeler and Will, Architects, Chicago, Ill.



Because of the one-story plan, the lines of the building are sweepingly horizontal. Only vertical element in the design is the massive dominant chimney with its off-center clock

classroom. Children may enter directly from outdoors through their classroom's individual play yard. On the window-seats they have their story corner. Near the corner of the windows is their own library.

Two walls of each classroom are glass—from window-seat to ceiling—and two are of waxed western pine, pleasing as a wall surface, yet receptive to thumbtacks. One of the glass window-walls faces south onto the play yard (another break from tradition), while the other is at east or west. Ample use of glass serves a more fundamental purpose than that of design or decoration.

The Lighting

Because of these window-walls, each classroom has an area of direct lighting almost double the usual 20 per cent of the floor space. The windows cast their light directly on the low, homelike ceiling without shadows and give desirable diffusion. To minimize glare, translucent curtains which can be spread across the entire window surfaces are hung from ceiling tracks. These curtains are colorful and gay, yet soft in the light they transmit.

Another tradition is obviously violated—that of having light come exclusively from one side so that it will shine over the children's left shoulders. This tradition not only ignores the needs of left-handed children; it also ignores the fact that in modern schools the movable desks are in various positions, not in straight rows. Obviously, when children at Crow Island are at work they do not directly face the windows, but the light coming from the two sides makes a variety of positions for each desk possible without the child's writing in his own shadow.

For artificial lighting, which is rarely needed, inset ceiling domes focus truncated cones of light downward to overlap at desk level, so that in no position can a child cast a dark shadow over his work. As soon as the sun goes under a cloud, lights in the least lit part of the room are switched on by an electric-eye control. As soon as sunlight reappears sufficiently, the lights automatically go off. Thus at no time do any of the children work without having sufficient light for their needs.

With more-than-adequate lighting from two sides, plus well-engineered artificial light, all reasons for a high ceiling disappear, and the much pleasanter living-room height becomes not only possible but practical. Furthermore, nearly enough money was saved by lowering the classroom ceilings to pay for the workrooms which adjoin each classroom. In fact, the cost of construction, even with the large glass area and the acoustically treated and insulated ceilings, is no greater than of equally fireproof construction of the standard type.

The linoleum-covered window-seats at the base of the two window-walls are set into the classroom far enough to provide ample insulation behind them, and to make a broad sill on which plants can be placed.

The yard to the south of each classroom is divided in two parts diagonally. That which is in the shade of the next adjoining classroom is paved with flagstone and is used as an outdoor classroom; the other half, which gets the full southern sun, is used for plant and nature study. The yard is a private yard of one group of children, and they, with their teacher, have full responsibility for its care and development.

Heat and Ventilation

Classrooms are heated from univents inconspicuously set in the ceiling. Each univent draws fresh air into the room, filters it, and directs it over radiator

pipes around the room in such a way as to give adequate circulation. Classroom windows may be opened freely by the teacher without upsetting the ventilation of any other classrooms and with no serious disturbance to the univent's distribution of heated air. In addition, there are radiators behind the window-seats under one window-wall, well insulated so that the children will not feel the direct radiation on the window-seats themselves.

Some observers have asked if the large window area might not make heating unduly expensive. It should be borne in mind that glass traps radiant heat as in a greenhouse or a closed automobile on a sunny day. This radiant heat when it is most needed, the lowered cubical contents of the room as a result of the lower ceiling, and the thorough insulation offset any possible heat loss and in the end make for economy with comfort.

The homelike atmosphere of the classrooms is heightened by the liberal use of primary colors in decoration. Each classroom has its own predominant color, first noticed in the flush-panel hall-door and echoed in draperies and in painted surfaces in bookcases, cabinets, and over the workroom sink. Furniture was designed especially for the school and made by craftsmen on the rolls of the Illinois WPA. Desks and tables are topped with stain-proof, scratch-proof formica, and seats for chairs are made of bent plywood.

The auditorium is the focal point of this community of children. Here all ages meet and their activities merge. Here, too, are focused extra-curricular activities of the adult Winnetka community—the families and friends of teachers and pupils. Comfortable seating and flexible capacity, for tiny pupils and large parents alike, are secured by using, instead of individual seats, benches with curved plywood backs.

The walls of the auditorium are of cinder concrete blocks, divided horizontally by bands of common brick "headers." Acoustical treatment, which makes

Throughout the school the plumbing has been carefully geared to educational needs. In the art room there is plenty of water for painting, for modeling, and for cleaning up

Learning to draw nature first-hand is facilitated by the two spacious wall windows. The foundation of a "young art gallery" can be seen on the pine walls in the far corner. Drapes of varied colors help to give the small child a sense of color

Left—The library is finished in the same white pine planking that dominates all interiors. Light is provided from the entire north wall and electrically controlled fixtures. There are tables for different ages, some with tilted tops for easy reading of large picture books and magazines, a comfortable fireplace and story corner, and liberal cupboard space

Right—The nursery school has an adjoining kitchenette and a milk bar. The architects would have liked to build the milk bar to the scale of the children (like the table at the right) but the height was dictated by those who work in the kitchen—adults

the most fragile of children's voices audible the length of the room, consists of extending ceiling and sidewalls from proscenium to rear in a series of shallow arcs.

A Community Center

It has been said that the Crow Island School is an architectural expression of an educational philosophy. Right here it may be suggested that it is also a community center: first, of the fourteen small communities of children growing up in its classes; and, second, of that larger community of families who, through the children, are served.

Not all the design of the Crow Island School is bounded by the limits of the building walls. With the assistance of two recognized authorities in supervised community recreation, Robert Everly and John McFadzean, of the Glencoe, Ill., Park and School System, the entire 5½ acres of the Crow Island site has been laid out for both beauty and use, with outdoor facilities for roller-skating, soccer, and softball—recreation for all school ages.

The Crow Island School was designed to be what a progressive school should be—a living, growing part of a community. Already there are signs that in the future more communities will build their schools, not as boxes for learning-by-dosage, but as work-and-play shops for study and recreation—not only for children, but for the entire community.

THE PHILIP CAREY COMPANY

Manufacturers of

Roofing and Waterproofing Products, Heat Insulations

Lockland, Cincinnati, Ohio

SPECIFY

Carey ROOFS

FOR LASTING PROTECTION

The roof of a school building represents little more than 1% of the total construction cost yet on its durability and weather-resisting qualities depend the protection of the other 99%. The school roof should be designed and built to last the life of the building. Re-roofing is an expense that need not be incurred under ordinary conditions if the right roof is selected and properly constructed.

Carey Roofs meet every requirement for modern school construction. For more than sixty years Carey Roofs have been specified for important public buildings throughout the United States, and their application to new school construction is increasing year by year because they have proved their durability and lasting protection against weather.

The quality of materials entering into Carey Built-Up Specifications are carefully checked by our engineering department and research laboratory, allowing a liberal factor of safety as to tensile strength, number of plies and thickness of plies, to assure adequate and permanent weatherproof protection.

FREE ROOF SURVEY

The Carey Roof Survey Plan has been in operation for several years and has been the means of cutting roofing upkeep expense to a minimum. Without obligation on your part, a Carey Inspector will make a careful survey of your roofs, flashings, parapets, etc., and give an honest and impartial report on their condition.

Carey Asfaltslate Shingles represent the standard of quality in composition shingles. They are built especially rugged and substantial to give extra years of trouble free service. They are proof against all ordinary fire risks and need no paint or other upkeep expense.

Careystone Asbestos Cement Shingles. Made of asbestos and cement, it provides a permanent roof possessing natural properties that enable it to resist the destructive influences of time, weather and fire.

Carey Heat Insulations. For low pressure steam or hot water heating systems, Careycel Pipe Covering has no equal. It combines high insulating efficiency with low cost. The Carey Heat Insulation Line is complete. A special insulation material to meet every service condition. Temperature ranges from zero to 2500° F.

Carey Waterproofing Materials. Carey waterproofing product for basement walls and swimming pools; Protective coatings to repair leaks and prolong the life of all types of roofs, protection paints for hot and cold metal surfaces.

For complete information on Carey Roofs and other products, write The Philip Carey Company, Lockland, Ohio.

The RUBEROID Co.

Executive Offices: 500 Fifth Avenue, New York, N. Y.

DIVISIONAL OFFICES

NEW YORK BOSTON (MILLIS) ERIE BALTIMORE MOBILE MINNEAPOLIS

RU-BER-OID
ROOFING AND BUILDING PRODUCTS

RU-BER-OID BUILT-UP ROOFS

SOUTH SIDE VOCATIONAL SCHOOL, Chicago, Ill. Protected with 27,530 sq. ft. RU-BER-OID 4-Ply Pitch and Felt. Architect: Board of Education, Chicago, Ill. (John C. Christensen). Approved Roofing Contractor: James Mansfield & Sons Co., Inc., Chicago, Ill.

BUILT-UP ROOFS

Free Catalog

RU-BER-OID Built-up Roofs are recommended for flat surfaces or roofs with a slight pitch. There are four popular types of RU-BER-OID Built-up Roofing: Asbestos felt and asphalt, coal tar pitch and tarred felt, asphalt felt and asphalt, and the combination roof consisting of asphalt felt, asphalt-saturated asbestos felt and roofing asphalt. You can choose the proper type to meet climatic conditions, anticipated life of building—fire hazards, construction of roof decks, etc.

When desired, RU-BER-OID Built-up Roofs are bonded for 10, 15 or 20 years, depending upon the specifications. Bonded roofs are applied only by Approved Ruberoid Roofing Contractors. Complete catalog will be mailed upon request.

INSULATING MATERIALS

Free Catalog

From the viewpoint of efficiency, Rock Wool is one of the finest insulating materials. Ruberoid offers you Rock Wool in three forms—loose or bulk for packing, granulated for pouring and in pre-formed bats for use between joists, rafters and studding. Complete data will be gladly forwarded upon request. Send for free catalog.

ASBESTOS-CEMENT SHINGLES

For pitched roofs, where beauty is a factor, where a roof must be weatherproof, fireproof, rotproof and time-defying—Eternit Asbestos-Cement Shingles win favor with the architect. These shingles, Ruberoid-made, come in various finishes, designs and colors.

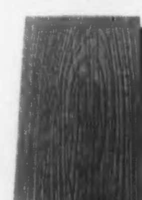
Gothics

ETERNIT GOTHICS

Eternit Gothic Asbestos-Cement Shingles are textured like natural rock. Tapered with a heavy butt, the Gothic Shingle lies perfectly, giving the effect of massiveness and yet without the burden of extra weight. Eternit Gothics may be applied with staggered butts. The shingle is 12″ wide and 16″ long with approximately ¼″ butts. Applied with 7″ x 12″ exposure. Weight approximately 525 lbs. per square.

ETERNIT TIMBERTEX

The companion Asbestos-Cement Shingle is Eternit Timbertex. This product reproduces the lovely texture of weather-aged cypress. It has all the qualities of Gothic, but gives the effect of mellowed wood. Its size is 8″ x 16″, with approximately ¼″ thick butts. The exposure is 8″ x 7″ and the weight is 525 lbs. per square.



Timbertex

ASBESTOS PIPE COVERINGS

The Ruberoid Co. has a complete line of heat and cold insulating products, including Asbestos and 85% Magnesia Pipe Coverings, Asbestos Papers, Sheet and Block Insulations, Insulating Cements, etc. A catalog covering RU-BER-OID Insulating Materials will be gladly furnished upon request.

85% Magnesia Pipe Covering

ASPHALT SHINGLES

Where a less expensive, yet durable, fire-resisting roof is required, Ruberoid offers Asphalt Shingles in various weights, colors and attractive designs. Full descriptive literature upon request.

For Complete information write to School Engineering Department, The RUBEROID Co., 500 Fifth Avenue, New York, N. Y.

THE AMERICAN BRASS COMPANY

General Offices

Waterbury, Connecticut

ANACONDA THROUGH-WALL FLASHING

Why Through-Wall Flashing?

—Because modern skeleton frame construction requires spandrel waterproofing. Quoting from the Kidder-Parker "Architects' and Builders' Handbook":

"Because of the gradual reduction of thickness of exterior walls and the use of hollow-tile construction, wind-driven rain and moisture enter the structure through the face brick and mortar joints. The result is the formation of water pockets, which eventually make contact with ceiling and wall plaster."

Why ANACONDA Through-Wall Flashing?

Anaconda Through-Wall Flashing installed under copings and at the bases of parapet walls or counter flashing level, also in side walls at frequent intervals (preferably at every floor and at all openings such as door and window-heads and sills), intercepts all rain water that seeps in and diverts it to the roof or outside face of the wall as desired, making the building walls completely rainproof.

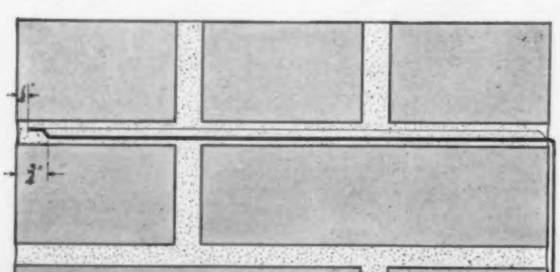
School Architects and School Building Contractors

who have used Anaconda Through-Wall Flashing are enthusiastic about its many advantages:

1. The 7/32"-high zig-zag corrugations provide complete bond in the mortar in all lateral directions.
2. The integral dam throughout its length is the full height of the corrugations.
3. The dam and corrugations combine to give complete assurance of drainage in the desired direction. **This flashing will drain itself dry on a level bed,** reducing to a minimum the possibility of wet walls and heaving by frost.
4. **The flat selvage permits neat, sharp bends for counter-flashing or locking to adjacent sheet metal without distorting the flashing or inhibiting free drainage.**
5. Anaconda Through-Wall Flashing is easily locked endwise, even with the selvage preformed, merely by nesting one or two corrugations. This makes the joint water-tight.
6. As shown in the illustration at lower left, the design of the dam is such, with its tongue near the top of the mortar joint, that this edge of the flashing can be placed within ¼-inch of the face of the wall and still provide sufficient bed for the pointing of the mortar joint so that it will not chip out. Thus, Anaconda Flashing protects more of the wet portion of the wall than is possible with types having turned-back dams.

One-Piece Inside Corner Flashing.

One-Piece Inside and Outside Corner Flashings are now available for both 8" and 12" walls. They are so designed that the corrugations will interlock with those of adjoining straight flashings. Installation is simple: A corner is flashed by first assembling the three flashing pieces, then marking their exact position on the masonry. The pieces are then removed and a thin bed of mortar spread on the wall, after which the straight flashings are laid and imbedded in the mortar. The corner flashing is put on last, lapping the straight flashings by two corrugations.



Cross-Section of Through-Wall Flashing Detail

Anaconda Through-Wall Flashing is Used in the Yorktown High School, White Plains, N. Y.

Anaconda Through-Wall Flashing is efficient, positive and durable, yet relatively inexpensive. It is readily adaptable to practically every masonry condition.

The principal feature of its design is the series of zig-zag ridges 7/32" high intersected at one end by a 7/32" longitudinal ridge which acts as a dam, causing any accumulation of water to flow to the opposite face of the wall.

The zig-zag ridges prevent lateral movement in any direction. The possibility of vertical movement may be disregarded, as a properly designed masonry wall has its mass and weight so proportioned in relation to wind and other forces that uplift does not occur under any normal condition except as a result of heaving by frost which, if of sufficient force to cause vertical movement of the wall or coping, would be sufficient to break the bond between masonry, mortar and flashing of any design. Actually, **Anaconda Through-Wall Flashing assures minimum risk of heaving by frost as it is so designed that it will drain itself dry on a level bed.**

"Anaconda Flashing is available in a variety of types and sizes, made of 16-ounce Anaconda copper. All standard types for 8" and 12" walls are carried in stock in 5-foot and 8-foot lengths. Wider flashings with continuous corrugations are furnished for thicker walls and for spandrel waterproofing."

Because it can be bent and cut to fit on the job, Anaconda Through-Wall Flashing can be installed easily and quickly, with a minimum of delay to bricklayers and masons. Tight end joints can be made by overlapping one or two corrugations.

Detailed information is contained in Anaconda Publication C-28-s. Copies available upon request.

TILE-TEX...FLOORS FOR THE MODERN SCHOOL

Willard Hall Dormitory for Women—Northwestern University, Evanston, Ill.

Tile-Tex is an asbestos-asphalt composition tile flooring, which has been used for seventeen years in schools throughout the United States. Tile-Tex floors give uniformly good service, represent on the average a low investment cost per square foot, and are maintained simply and economically. They represent what we honestly believe to be the greatest value in floors for schools that can be purchased today.

Tile-Tex is designed and manufactured to meet the demand for a low cost flooring, installed in tile size units, that will withstand heavy foot traffic under exacting conditions over a long period of years. Prominent school architects throughout the nation specify Tile-Tex consistently and know from experience that the Company manufacturing it can be relied upon to stand behind the material and improve it year after year.

On the following pages are photographs showing Tile-Tex in use in practically every type of area found in schools today. Tile-Tex is often specified because of this versatility and adaptability to a wide variety of uses. Hundreds of Tile-Tex installations in schools throughout the country are mute testimony to the quality of the product and the knowledge and skill of the Tile-Tex contractors who install it.

Tile-Tex is available in three thicknesses—1/8″, 3/16″, and 1/4″. It is made in a wide variety of sizes, which include the following: 3x3, 3x6, 4x4, 4½x4½, 4x12, 6x6, 6x12, 6x18, 9x9, 9x18, 9x27, 12x12, 12x24, 18x18, 18x24, and 6″ Hexagon.

Tile-Tex welcomes constructive criticism from all school officials and is constantly ready to help in the solution of any problems connected with schoolhouse floors.

Top photo below—For special areas, such as a domestic science room, Tile-Tex is both practical and attractive. Here ease of cleaning, closely textured surface, and resistance to food abuse are met by the use of Greaseproof Tile-Tex. Installation shown is the domestic science room in the Wappingers Falls, N. Y., Central School.

Bottom photo below—For laboratories, Tile-Tex is acid and alkali resistant, comfortable to stand and walk on, and easy to clean. Tile-Tex was selected for the Guggenheim Dental Clinic laboratory, New York City, because of these qualities.

The Tile-Tex floor shown above is in the Southampton, L. I., N. Y., Grade School. It is long-wearing, non-distracting to the pupil, easy to keep clean, and suitable for either fixed or movable seating equipment.

For auditoriums, Tile-Tex is flexible in design, adapted for ramps and inclines, easy to clean, and durable. Below you see Tile-Tex in service in the auditorium of the Bay Shore, L. I., School.

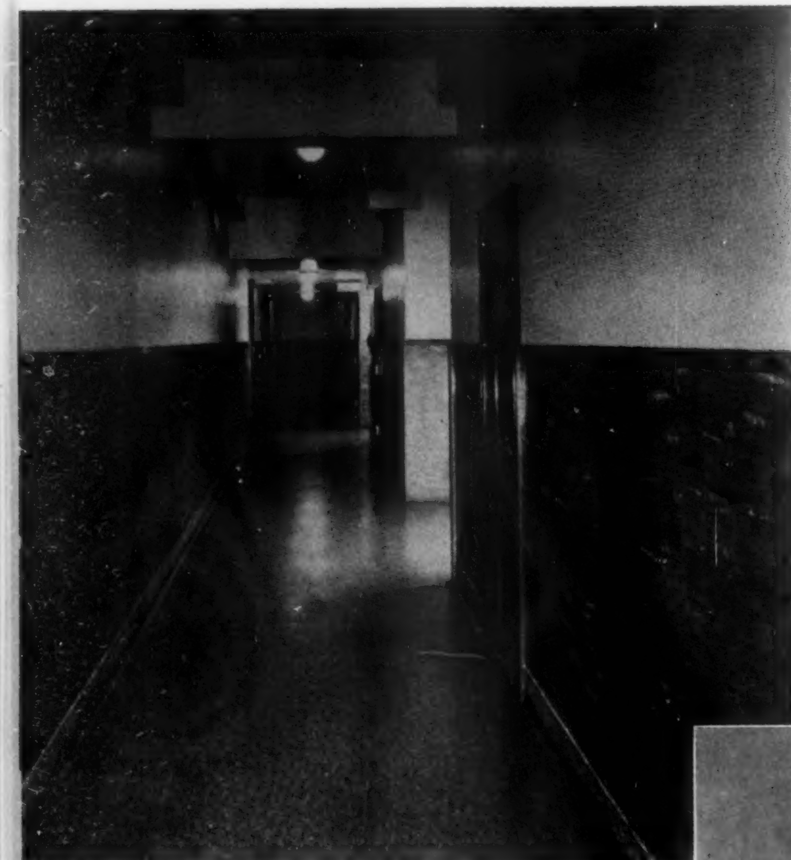
Right—School corridor areas are a "natural" for Tile-Tex floors. The corridor floor shown here, in the Southampton, L. I., Grade School, is safe to walk on, attractive, easy to maintain, quiet, durable, and economical.

Below—For this social room area, in Northwestern University's new Willard Hall, Tile-Tex was found to be the perfect answer for an attractive, serviceable floor, so necessary for this type of use. Note the striking modern design.

Above—Kindergarten, Mattituck, L. I., N. Y., Grade School. Here is a Tile-Tex floor that is safe for children to play on, quiet, attractive, sanitary, and easy to clean.

Right—Tile-Tex was the answer to the floor problem in the gymnasium at St. Vincent's School, Buffalo, New York. Unaffected by moisture, non-slip when unwaxed, and sufficiently resilient, Tile-Tex makes an excellent gymnasium floor.

TILE-TEX WALLS ARE IDEAL FOR SCHOOL WAINSCOTING



Tile-Tex Wall Tile is a new and adaptable wall covering material, well suited for school purposes. It is a flexible, individual tile manufactured from asbestos fibre, mineral coloring pigment, and special binders. Tile-Tex Wall Tile can be applied over existing plaster walls in present buildings, or over smooth plaster backing or smooth-surface wallboard in new construction. Its cost is considerably less than that of conventional ceramic tile.

Above you see Tile-Tex used as an attractive corridor wainscot. Its use here obviates the need of painting over that area covered by the wainscot. Over a period of years, this means a considerable saving as against paint or any other type of surface which must be renewed. Fingerprints, so common on painted walls, will not show up on appropriate, selected colors of Tile-Tex. Any dirt marks or stains can be easily removed with a damp rag and Kitchen Klenzer.

Right—In cafeterias, Tile-Tex has proved itself an excellent wainscot material. In the Wappinger Falls, N. Y., Central School shown here, the wainscot is plain color Tile-Tex Wall Tile. Incidentally, the floor here is also Tile-Tex, laid in colors to harmonize with the wall tiling.

Other areas where this new, unique wall covering can be used are toilets, rest rooms, and laboratories.

Colors—Tile-Tex Wall Tile is available in a wide range of colors, from light pastel shades to medium and darker hues. Over 32 colors are included in the Aristocrat color group. Send for the booklet, "Decorative Walls by Tile-Tex," which includes complete color charts.

Sizes—Fourteen sizes, from small to large, make possible wall treatments heretofore not obtainable with other types of material. Sizes include the following: 3x6, 4x4, 4½x4½, 4x12, 6x6, 6x12, 6x18, 9x9, 9x18, 9x27, 12x12, 12x24, 18x18, and 18x24.

WALLS TILE-TEX FLOORS

THE TILE-TEX COMPANY

CHICAGO HEIGHTS, ILLINOIS
101 PARK AVENUE, NEW YORK

SERVICISED PRODUCTS CORPORATION

Manufacturers and Distributors

CONSTRUCTION MATERIALS

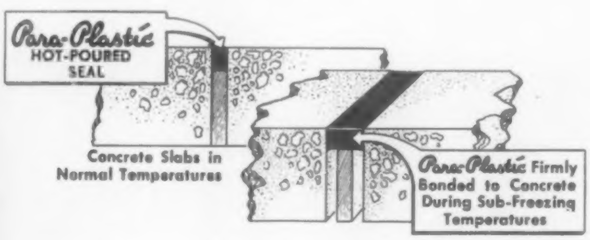
6051 West 65th St., Chicago, Ill.

REPRESENTATION IN ALL PRINCIPAL CITIES

Building Products — Sewer Jointing Materials — Industrial Products

PARA-PLASTIC HOT-POURED SEALING COMPOUND

Insure water-tight crevices with this excellent sealing compound. SERVICISED has developed this product to serve efficiently in construction work. Known as PARA-PLASTIC, this hot-poured seal is an asphaltic rubbery compound. It is designed for use with the non-extruding type of expansion joints. The illustration below indicates the unusual performance of this hot-poured seal during expansion and contraction of the concrete slabs.



Temperatures ranging from below 0° to 180° F. do not effect the functions of PARA-PLASTIC because the adhesive and resilient qualities of this composition maintain a tight seal against infiltration of water or any other foreign matter.

This product is well recommended for new construction jobs and is also practical for various types of maintenance work. Extensively used in concrete highway construction, airport runways and reservoirs.

Para-Plastic Hot-Poured Sealing Compound insures a positive joint seal under any climatic conditions.

SEND FOR FURTHER INTERESTING DATA ABOUT THE MIGHTY "GRIPPING" MERITS OF PARA-PLASTIC

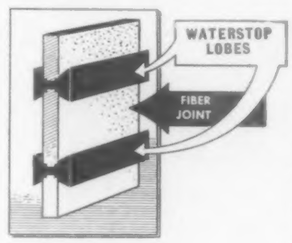
* * *

OTHER PRODUCTS

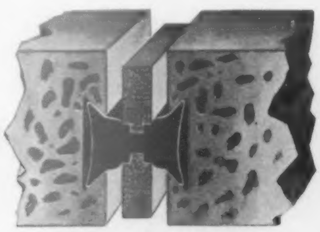
- 2-In-1 Die Cast Method
- Hot-Poured Compound
- Tufflex (cold trowelled compound)
- Premoulded Sewer Pipe Belts
- Asphalt Plank
- Mineral Surfaced Asphalt Plank
- Slate Surfaced Asphalt Plank
- Asphalt Plank Protection Course

WATERSTOP EXPANSION JOINT

Designed for use on construction jobs where it is essential that expansion joint crevices remain water-tight. We recommend this WATERSTOP Expansion Joint for use in concrete pavements, dams, swimming pools, reservoirs, retaining walls, basement walls and floors and wherever necessary to prevent the infiltration of water. The WATERSTOP is a recent development devised especially to keep joint crevices water-tight during periods of expansion and contraction.



Normal Position



Extreme Contraction

The above sketch illustrates the performance of this joint during contraction of concrete slabs. This method prevents infiltration of water at this critical time. The Waterstop Expansion Joint may be obtained with one or two waterstop lobes.

We assure you that your investigation in the various uses of the Waterstop Expansion Joint will be of unusual interest. Prices and further data will be sent upon request.

Other Well Known Servicised Expansion Joints Used Extensively Are: Asphalt, Fiber, Cork, Cork-Rubber, Sponge-Rubber and Self-Expanding Cork.

SERVICISED is the only manufacturer of all of the above expansion joints.

Write Us for Complete Information of the Various Products We Manufacture

SERVICISED PRODUCTS CORPORATION

CONGOLEUM-NAIRN INC.

General Office: Kearny, New Jersey

Nairn Linoleum . . Ideal for Floors and Walls from Kindergarten to Post Graduate School

The pictures on these two pages illustrate the many uses of linoleum floors and walls in modern school construction. A striking example of the desirability of Nairn Linoleum in school buildings.

The various uses for a truly resilient floor are manifold—resulting in rooms that are quiet, attractive and comfortable for study and recitation.

Combining with modern equipment and methods, Nairn Linoleum affords complete flexibility to school floor and wall needs. Nairn Linoleum, more popular today than other floors, may be used in proper form for every school room and corridor requirement.

Nairn Linoleum, with its perfectly smooth, sanitary surface, has long been recognized as the ideal school floor. It is quiet and resilient underfoot, and easy to keep spotlessly clean. Moreover, it is inexpensively installed and lasts for years under the most punishing foot-traffic, without costly refinishing.

For school **walls,** Nairn Wall Linoleum provides an attractive, washable, **permanent** finish that is fade-proof, crack-proof and water-proof.

An attractive, appropriate Nairn Veltone floor in the kindergarten of the Red Hook Central School. Note the use of Nairn Wall Linoleum to wainscot height, with one-piece cove base and border where walls and floor meet

Nairn Linoleum gives this staircase beauty and safety. Veltone, on the treads, with Nairn Wall Linoleum on walls and rounded over stair bannisters

Medical offices in Red Hook Central School. Nairn Linoleum with one-piece cove base eliminates hiding places for dirt or germs

For durability on floors, safety on stairs, utility on walls, and for beauty and cleanliness throughout, Nairn Linoleum products present self-evident and long-lasting testimonials to the diversity and value of linoleum for schools.

The range of design and color combinations in Nairn Linoleum for interior decoration are virtually unlimited and adaptable to almost every area in school construction.

Nairn Linoleum Floors and Walls are superior to other types of interior covering because they are more durable, easier to keep clean, germ-killing, insulating, beautiful in their own right, and—**not more expensive.** Nairn Linoleum makes any school a more pleasant, more inspiring place in which to work and learn.

For catalogs, samples, and free assistance in your wall or floor problems, write our Special Account Department at Kearny, N. J.

Unique and practical use of Nairn Wall Linoleum in a window seat in the Red Hook kindergarten

NAIRN

Reg. U. S. Pat. Off.

Linoleum Floors and Walls

The *perfect* corridor floor—Nairn Veltone Linoleum. It muffles the sound of clattering footsteps, yet will stand up under the most punishing heavy-duty service

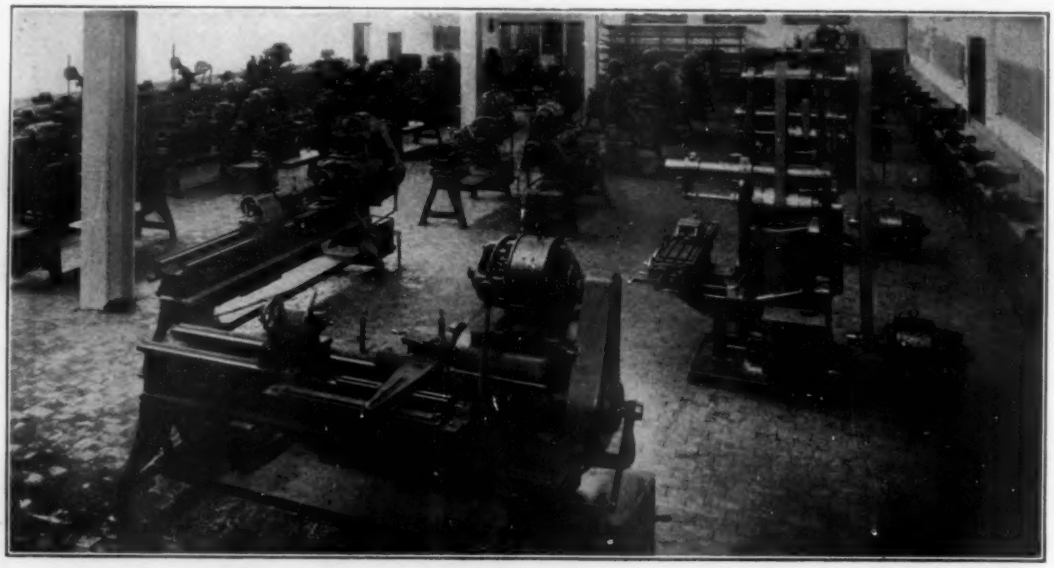
CONGOLEUM-NAIRN INC.

KEARNY, NEW JERSEY

THE JENNISON-WRIGHT CORPORATION

Toledo, Ohio

BRANCHES IN ALL LARGE CITIES



Kreolite Separate Wood Block Floors serve in the school and educational institution no less than in the factory and work shop where today their use is so general as to reveal Kreolite as the national choice for heavy-duty service.

Especially is Kreolite specified for all departments where mechanical operations are carried on. Tools are not damaged when they are dropped, for the Kreolite floor is resilient. The floor is not damaged because wear and accident leave no appreciable impression upon the tough end grain surface of the specially treated selected wood blocks.

Among the scores of leading educational institutions now enjoying the economy and benefit of Kreolite Wood Block Floors are: East Tech. High School, Cleveland, Ohio; Jefferson High School, Los Angeles, Calif.; Lindbloom High School, Chicago, Ill.; University of Michigan, Ann Arbor, Mich.; Purdue University, Lafayette, Ind.; Technical High School, Indianapolis, Ind.; University of Illinois, Urbana, Ill.; University of Wisconsin, Madison, Wisc.; Yale University. New Haven, Conn.

Write for complete information

KREOLITE

WOOD BLOCK FLOORING

Kreolite Wood Block Floors Used in Over 200 Schools!

Kreolite Flexible Strip End Grain Wood Block Floor in the Gymnasium of the New York State Vocational Institution, West Coxsackie, New York

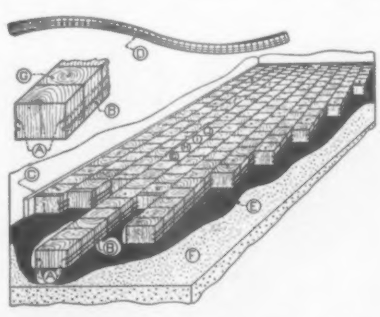
One of the many Kreolite gymnasium floors giving maximum of resilience, safety, appearance, wear, non-slipping, and all around satisfaction as to its ability to successfully withstand gymnasium play of all kinds.

The value of Kreolite Flexible Strip End Grain Wood Block Flooring is recognized instantly by the modern architect of schools and public buildings. They cannot become loose in the floor. The durability is practically limitless as the strips are laid with the tough end-grain of the individual blocks uppermost. The light natural color and beauty of the wood are retained, although the blocks are treated with a transparent, waterproof preservative.

Complete Information Sent on Request

(a)—Metal wire truss binding the individual blocks into a compact, solid monolithic-like end-grain plank or strip.

(b)—Metal spline binding the individual strips together.



(c)—Cork expansion joint laid flush with the surface of the floor.

(d)—Flexibility—can be laid over wood sub-floor, in mill type buildings.

(e)—Waterproof membrane between concrete and strips.

(f)—Smooth finish concrete foundation.

(g)—Surface sanded smooth.

(h)—Manufactured from properly dried yellow pine or fir.

(i)—Treated with a transparent, odorless, waterproofing preservative so that the natural light color of the wood is maintained. The surface of the floor may be waxed and highly polished if desired, presenting a most pleasing and beautiful design.

(j)—Laid with the tough end-grain up. End-grain blocks run full depth of strips, from top to bottom, each block being anchored to the base, in a bed of mastic.

Kreolite Wood Block Floors Used in Over 200 Schools!

JOHNS-MANVILLE

22 East 40th St., New York, N. Y. OFFICES IN ALL LARGE CITIES

The Hall of Music, Purdue University, is one of many examples of the use of J-M Sound Control by leading institutions of learning to provide proper hearing conditions in auditoriums.

J-M SOUND CONTROL FOR SCHOOLS AND UNIVERSITIES

To school authorities faced with a problem involving control of sound, Johns-Manville offers the fruits of long practical experience and a background of more than 30 years of scientific study and research. From the J-M Acoustical Research Laboratories have come many of the developments which have today made it possible to provide a practical, economical solution to any type of sound control problem.

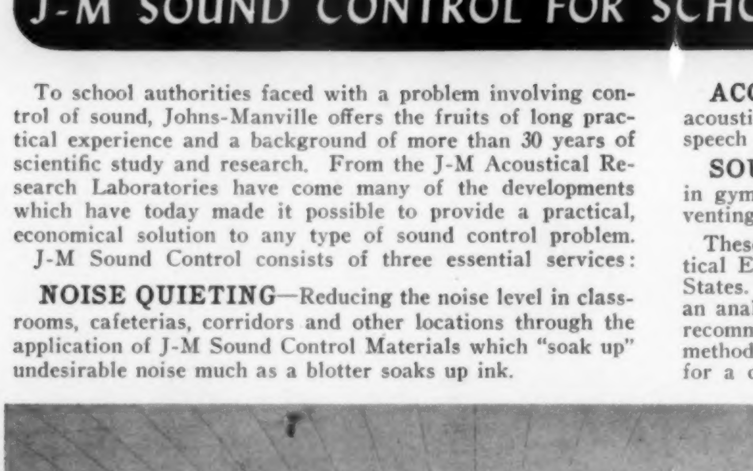
J-M Sound Control consists of three essential services:

NOISE QUIETING—Reducing the noise level in classrooms, cafeterias, corridors and other locations through the application of J-M Sound Control Materials which "soak up" undesirable noise much as a blotter soaks up ink.

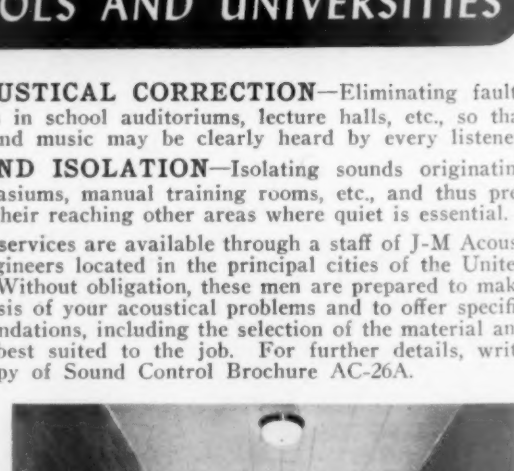
ACOUSTICAL CORRECTION—Eliminating faulty acoustics in school auditoriums, lecture halls, etc., so that speech and music may be clearly heard by every listener.

SOUND ISOLATION—Isolating sounds originating in gymnasiums, manual training rooms, etc., and thus preventing their reaching other areas where quiet is essential.

These services are available through a staff of J-M Acoustical Engineers located in the principal cities of the United States. Without obligation, these men are prepared to make an analysis of your acoustical problems and to offer specific recommendations, including the selection of the material and method best suited to the job. For further details, write for a copy of Sound Control Brochure AC-26A.



A ceiling of Permacoustic, one of many J-M Acoustical Materials available, assures quiet in the library of the E. J. Harrington School, Lynn, Mass.



A J-M Acoustical Ceiling eliminates disturbing "corridor clamor" at St. Patrick's School, Menasha, Wisc.

J-M ASPHALT TILE FLOORING

This dining hall floor illustrates one of many attractive patterns possible with J-M Asphalt Tile. And this versatile flooring is as serviceable as it is beautiful!

Highly wear-resistant, easy to maintain, yet resilient and comfortable to walk on, J-M Asphalt Tile is an excellent flooring for the heavy traffic in school corridors

As a decorative resilient flooring of low first cost, exceptional durability and extremely low maintenance, Johns-Manville Asphalt Tile has found widespread acceptance with school and university officials. Many millions of square feet are in use in classrooms, corridors, gymnasiums and other locations where economy and serviceability are important.

The raw materials used in J-M Asphalt Tile are mined, processed and refined under standards that are rigidly controlled to insure a uniformly high-quality product. Selected asbestos fibres from Johns-Manville's own asbestos mines are the largest single ingredient. These, with the moisture resistant asphalt and inert mineral fillers which are added to increase density, are combined to form a floor covering that cannot rot, is highly resistant to moisture, resilient, comfortable to walk on, sanitary, and because of its high resistance to abrasion, gives many years of service with little attention for maintenance.

J-M Asphalt Tile is available in an extensive selection of both plain and marbleized colors and a wide range of sizes, permitting literally hundreds of interesting floor patterns. Made in precision-cut units, the tiles are quickly and economically laid over any suitable sub-floor. All units are now pre-waxed at the factory, providing a finished floor which requires no waxing or polishing before it is ready for service and protecting the floor from possible rough usage in connection with other construction activities.

For further information, see Sweet's Architectural catalog or write for full-color Brochure FL-20A.

J-M BONDED ASBESTOS BUILT-UP ROOFS

As pioneers in the roofing field and manufacturers of a complete line of built-up roofing products, Johns-Manville recommends the Smooth-Surfaced Asbestos Built-Up Roof as the most satisfactory for school service from the double standpoint of economy and fire-protection.

The asbestos felt as used in the J-M Smooth-Surfaced Roof does not support combustion and therefore provides a marked superiority in fire-resistance over the ordinary roofing felt. The protection offered by the smooth-surfaced asbestos roof against roof-communicated fires has been demonstrated many times in actual service.

Furthermore, since asbestos has the durability of stone, long exposure to sun, rain and weather have little effect on these roofs. Rot-proof, they need no periodic coating with slag or gravel. Maintenance costs are correspondingly low. Many Johns-Manville Smooth-Surfaced Asbestos Roofs that were applied 25 and 30 years ago are still giving service with little or no upkeep, testifying to the outstanding economy of this type of built-up roof.

Further details and specifications furnished on request.

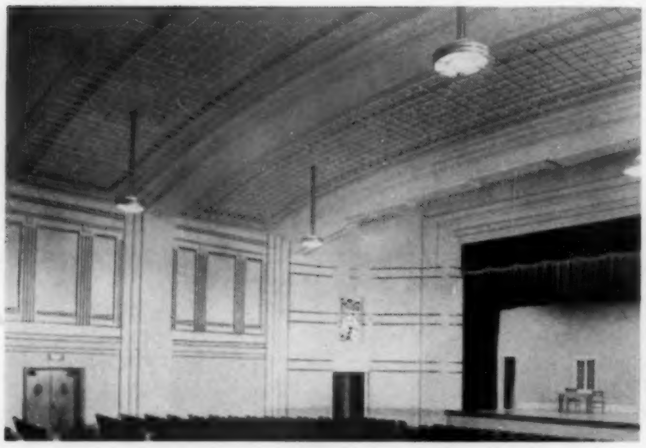
Bonded for 10 years—still going strong after 25 years of service! That's the record of the J-M Asbestos Built-Up Roof on the Poly Prep Country Day School, Brooklyn, N. Y. It is typical of the service provided by these better built-up roofs

WOOD CONVERSION COMPANY

Manufacturers of

NU-WOOD Interior Finish . . . and BALSAM-WOOL Sealed Insulation

St. Paul, Minnesota



NU-WOOD KOLOR-FAST—High Sound Absorption

NU-WOOD STA-LITE—High Light Reflection

NU-WOOD Insulating Interior Finish — KOLOR-FAST and STA-LITE

Nu-wood (Kolor-Fast and Sta-Lite) Interior Finish is a wall and ceiling covering for all types of school rooms. It is available in many sizes, shapes and colors, making possible unlimited designs and color combinations. Nu-Wood builds beautiful pre-decorated interiors, insulates against heat and cold, improves acoustics and reduces noise.

Nu-Wood Interior Finish is a distinctly different product available in Tile, Plank, Board and Wainscot. Each unit is designed to fit mechanically and harmoniously with the other—the completed job having the following outstanding qualities:

1 **TEXTURE.** A unique textured surface which gives walls and ceilings a rich, velvety appearance. A matte surface which reflects light without glare or "Hot Spots."

2 **A NEW, EXCLUSIVE JOINT** treatment on plank and tile which results in a superior application. The tongue and groove eliminates breathing—improves insulation value. The shallow bevel reduces the shadow line in keeping with today's interior decoration technique.

3 **INVISIBLE NAILING** made possible by the new Nu-Wood Clip System.

4 **THERMAL INSULATION.** Nu-Wood brings added insulation to the school building, reducing school bills in winter and providing greater coolness in summer. Thermal conductivity .324.

5 **ABSORPTION VALUE.** Nu-Wood absorbs sound, quiets noise, improves hearing.

6 **EASY APPLICATION.** Nu-Wood can be applied directly over cracked plaster or other disfigured walls. In new construction it may be applied to furring strips or framing members.

7 **PERMANENCE.** Nu-Wood requires no maintenance other than occasional cleaning with rubber sponge.

8 **LOW COST.** With these advantages—decoration, acoustical treatment and insulation—Nu-Wood is surprisingly low in cost.

KOLOR-TRIM MOLDING. Pre-decorated wood moldings are especially designed to harmonize with various Nu-Wood shades. They add the finishing touch which makes each job superior in style. Kolor-Trim Moldings make it possible for the carpenter to do the complete interior finish job at low cost.

NU-WOOD KOLOR-FAST

FADEPROOF BEAUTY. For the first time in an insulating interior finish, Nu-Wood Kolor-Fast offers colors which have been pronounced fadeproof by nationally recognized testing laboratories.

HIGH SOUND ABSORPTION. Unlike an ordinary coated board, the exclusive manufacturing process maintains the original high sound absorption of Nu-Wood Kolor-Fast. It quiets noise, corrects faulty acoustics. Sound absorption value .35.

NU-WOOD STA-LITE

LIGHT REFLECTION—76%. The highest light reflection attainable in a commercial product of this type plus a matte surface preferred by lighting engineers.

PERMANENCE. The Florida testing service, after subjecting Nu-Wood Sta-Lite to most severe tests, reports that the surface actually grows lighter with exposure—that most interior finishes turn darker.

SOUND ABSORPTION. Impartial laboratory tests give Nu-Wood Sta-Lite a sound absorption rating of .25—more than enough for a product of this type.

FURTHER INFORMATION ABOUT NU-WOOD KOLOR-FAST AND STA-LITE WILL BE FURNISHED UPON REQUEST

FREDERIC BLANK & COMPANY, INC.

New York Central Building, 230 Park Avenue, NEW YORK, N. Y.

Sun Fast **fabron** *Washable*

Reg. U. S. Pat. Off.

the Fabric Wall and Ceiling Covering, Made in U.S.A.

Solves "Headache" Problems of Wall and Ceiling Decoration and Maintenance

Economically — Attractively — Efficiently

What Is Fabron?

Fabron is totally different from any other wall and ceiling treatment. It incorporates structural, decorative, practical and economical advantages evolved from 50 years of laboratory research plus practical world-wide experience in solving the problems of wall covering installations in diverse buildings under widely contrasting climatic conditions. It is the worthy American successor to our world-famous Salubra.

Exclusive Characteristics

Fabron has a sturdy canvas foundation with a pyroxylin coating on which lacquer paints specially-compounded, have been fused into a structural unit to make its surface resist light and withstand maximum wear for all-around usage. Its exclusive formula, i.e., its "physical" composition; its resilience; its "glovey" feel; its appearance; the service it renders, is not only different but self-apparent. Fabron rolls are lacquer paint on canvas strips.

YOUR School and Fabron

Rising service loads and widening community responsibilities double school problems of maintenance. The strictest economies and efficiencies are required to maintain mandatory high standards. Safeguarding school health with hygienically-clean premises is a "must." School walls and ceilings—80% of visible interior surfaces—when correctly decorated according to the principles of colour science are a positive aid to sight-protection.

Special School Collection and Advisory Service.

Fabron's Institutional Collection of colours, textures and patterns exemplifies 50 years of international style-leadership. It includes correct selections for widely-different use: —Auditoriums, Classrooms, Corridors, Dormitories, Lobbies, Offices, Public Rooms, etc. Our **School Advisory Staff** is at your service to answer questions, assist in solving problems. **Colour Schemes, Cost Estimates, Without Charge. Write for Details.**

FABRON SCHOOL ADVISORY SERVICE

If you do not have a consultant, we offer the services of our School Advisory Department, which for years has specialized in solving decoration problems. We will be glad to suggest backgrounds that complement correctly the recommendations of your Light Engineers. On new construction or any re-modeling work, we co-operate with your Architect if desired in the creation of decoration in harmony with proposed architectural details. YOUR adoption of FABRON will represent a decorating policy of practical economy.

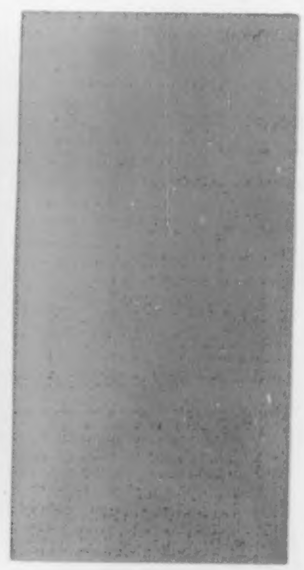
Colour Schemes, Cost Estimates and Expert Advice are Submitted Cost Free for Your Consideration

FABRON Is Washable—Sun Fast

STUDY THESE SAMPLES OF FABRON

Experiment with Them.

FABRON Is Not an Oilcloth



Facts About FABRON Fabric Wall and Ceiling Covering

1. ***Cracked walls or falling plaster*** are a constant problem. Unsanitary—they are breeding spots for germs. Fabron hermetically seals the walls, is a hygiene aid. Unsightly cracks mar room appearance, requiring frequent re-decorating expenses. Fabron's sturdy canvas base gives permanent structural protection to plaster; prevents appearance of cracks; binds and strengthens weakened or patched plaster.

2. ***Plaster repairs are a major expense.*** They often require a complete re-decorating job.
Fabron strips are readily removable for plaster repairs, can be lifted clean from the wall area and re-applied when repairs are completed. *Fabron saves re-decorating costs.*

3. ***You may be troubled with peeling paint.***
By a simple, economical preparation of such surfaces, you can apply Fabron, eliminate such defects.
Fabron is non-peeling, non-scaling.

4. ***School walls are marred with scuffs and scratches.***
Fabron's resilient surface withstands ordinary impacts of furniture and equipment—they do not break through the surface as with paint.

5. ***Your School Walls should be cleanable,*** scrubbable, disinfectable—if necessary, without injury to their appearance. *Fabron's lacquer colours are Sun Fast and Washable.* They can be restored to their original freshness with water, soap and scrub brush, soft cloth or sponge.
Usual Hospital disinfectants do not damage Fabron. Fabron is vermin, odor, dust, soot-proof. Stains difficult to eradicate—ink, pencil marks, etc.—can be removed without injuring Fabron's surface by applying proper dissolvent. Any *chemical* odor of Fabron disappears on application to wall.

6. ***Re-decoration charges are frequent and costly.***
No matter how low your costs run for labor and material, the cumulative expense of yearly re-decorations are sizeable over a period of time.

Check Your Cost Sheets! Compare! "Investigate Before You Invest."

Over a 5-year period, do you know your total expenditures for wall and ceiling treatments; what paint and re-painting cost you in materials and labor? *The amount spent—a recurrent budget drain—will astonish you.* The initial cost of Fabron is a fraction of this total sum. Fabron renders many years of service, saving costs of re-painting. Figured on an actual per year service cost basis, Fabron is the most economical wall treatment obtainable. On new walls, the initial investment for Fabron is not necessarily higher than that for good paint.

DECORATIVE ADVANTAGES

A. **Eye-Appeal**
Do you regard your plant as mere physical buildings; walls, ceilings, windows, roof, etc., or—in line with modern thought—do you appreciate its potency as a media for moulding character, imagination, good-taste; for conditioning American youth during its impressionistic years for balanced adult living? Colour in schools is a dynamic tool—either stimulating or depressing; a harmonizing or disturbing influence.
Fabron's special **School Collection** simplifies the selection of the exactly-right colours and textures that create the distinctive appearance school interiors require.

B. **Correct Colour Values Ensured According to Established Colour Schemes.** With Fabron you know in advance what the effect will be. No mixings or matchings of colours — no misunderstandings — no disappointments.
(1) Fabron eliminates all uncertainties connected with hand-applied paint, such as:
(a) *Human Element*—Wrong shade, imperfectly applied or appearing different on walls than expected.
(b) *Possibility of Adulteration*—you get exactly what you specify—a laboratory-uniform product.
(2) Fabron retains original colour-values, insurance against "staleness." Sun Fast and Washable.

PRACTICAL ADVANTAGES

A. **Washable—Sanitary, Fabron's Upkeep Is Easy, Economical.**
Fabron's washability is real and practical, an integral factor not derived from any superficial application, but inherent in the product itself. Fabron is non-porous. Ordinary surface dirt and stains can be washed off as often as necessary, restoring surface to original beauty and freshness. Stains, usually difficult to eradicate, can be removed without injuring surface by applying proper dissolvent.

B. **Sun Fast—Insurance Against Depreciation**
Fabron's lacquer colours are compounded to resist the action of light. Original beauty of interior colour scheme can be maintained.

C. **Easy to Apply**
1. Paperhanger of average skill can install.
2. Fabron is lacquer paint scientifically-applied by laboratory methods to sturdy canvas and comes in rolls, ready for use.

D. **Durable-Permanent Base for Subsequent Paint or Other Treatment.**
Fabron seals the pores of the walls and, being non-porous, offers ideal base for future decorations when desired.
1. Durability makes re-decoration a choice, not a "must."
2. Protects plaster for years.

INITIAL COST

A. **Popular Prices**
1. Based on our low institutional price listing, cost of Fabron ranges from about 3⅓ cents per sq. ft., quality uniform regardless of price. Elaborate designs cost in ratio.
2. **More for Your Money.** *Because we both manufacture and distribute Fabron, we can offer a product with exceptional values at competitive prices.*
3. Lies within average budget for good paint job.

B. **Easy, Swift Installations**
1. Easy to hang.
2. Creasing and tearing precluded by fabric strength.
3. Lends itself to perfect butting, invisible seams.

C. **Efficient Roll-Size. Convenient 27" width.**
The Fabron single roll has 36 square feet and is 16⅔ feet long by 27 inches wide, trimming to 26 inches net. For economy in cutting, Fabron comes in double rolls only, i.e., 33¼ feet long by 27 inches wide and should, therefore, be ordered in an even number of single rolls. Prices are quoted per single roll.

D. **Fabron Is an Investment in Beauty, Utility, Economy and Sanitation**—Consider its cost in relation to—
1) Capital Investment; 2) Duration of Service; 3) Maintenance and Repairs; 4) Physical and Functional Properties—or any other angle of comparison.

WHY COLOUR IN SCHOOL INTERIORS?

School esprit and scholarship; parent-satisfaction and institutional prestige demand decorative treatments that create correct psychological effects on students and staff, relieve interiors of monotony and impress occupants and visitors alike with attractive friendly, modern surroundings. Colour is attractive. Today, making buildings attractive—whatever function they serve—is a major objective. Understanding of this psychology and its practical application in establishing colourful conditions in public buildings, as well as private, is widespread. School managements seeking the means for establishing the happier environment so important an aid in developing the best approach to life, recognize that colour is a necessary aid in education.

Colour in schools is correct only when it is used in proper relationship to the entire interior. Its success depends on its functional ensembling, i.e., its application in combination with the individual variations of a given interior—its size, shape, light conditions and usage. Colour in homes aims to satisfy personal tastes and whims. Decorative principles correct for the home should not be applied to School Decoration. Its solution must be based on its collective benefits to pupils and staff.

The introduction of colour is an improvement over traditional ivory and buff treatments. However, problems such as efficiency of maintenance or visual elimination of existing structural defects are not solved satisfactorily through the use of colour alone. Texture decoration is the logical step from Plain or Patterned surfaces. A contemporary innovation, Texture is an all-over surface effect secured by the super-imposition of related colours whose purpose is the elimination of colour-plainness. In contrast to Plain surfaces, note the following advantages of Textures:—1) Relieve monotony of large spaces—have eye-appeal. 2) Camouflage plaster defects and uneven walls. 3) Introduce added decorative value. 4) Increase ease of maintenance. While in some school areas, designs are desirable, textures are the ideal decorative treatment for the largest percentage of school interiors.

Test the Maintenance Ease of Textures

Rub your finger on the painted wall next to you. Do the same with the attached Fabron samples. See how conspicuous your fingerprint is on paint in contrast to Fabron Textures. Test the ease of cleaning Fabron. Moisten your handkerchief and remove the spot.

Sight-Protection

Textures are an aid to sight-protection; they break up glare. Glare or gloss are bad for the eyes; spots and sheen are harmful. Introducing the latest improvements in fixtures does not thereby create good lighting unless reflecting walls and ceilings are appropriate. The primary sources of light are fixtures and windows. The secondary or auxiliary sources of light are the reflectances from walls and ceilings which affect the *quality of light* secured. And *quality of light* is the desideratum for sight-protection. While remarkable improvements have been made in the primary sources of light, similar progress has not been made in taking advantage of aids offered by secondary sources of light. Without background, light is non-existent. Hence, decoration can aid in creating better lighting conditions. Good lighting is a combination of modern fixtures and the correct wall and ceiling treatments that reflect light most advantageously—for both sight-aid and sight-protection.

Science of Colour and Light

The science of colour has made revolutionary advances in the past few years. Today, complex machines perfected after years of experimentation graph colour waves, give each its number name. Hitherto, we knew only "visual" colour matches. Today, science makes possible the exact reproduction of a colour by identifying its "physical" characteristics and recording them. Colour reflectance has been charted. Different shades have different reflectance percentages, varying according to the pigment mixtures composing each. Frequently the commonly-accepted idea of a given colour-tone is diametrically opposite to the scientific fact. Competent light engineers who are specialists in light-origins and light-reflectances can aid in sight-protection and wattage efficiencies.

We Invite You to Consult Our School Advisory Department

MAY WE SUGGEST YOU INSTALL A TRIAL ROOM?

Sun Fast fabron ***Washable***

Reg. U. S. Pat. Off.

the Fabric Wall and Ceiling Covering, Made in U.S.A.

THE CELOTEX CORPORATION

919 N. Michigan Avenue
Chicago, Illinois

ENROLLED PERMANENTLY IN THOUSANDS OF SCHOOLS—QUIET BRINGS PERPETUAL ENDOWMENTS

This picture of the Hush Girl is a symbol of Celotex Acoustical Treatment as used in schools throughout the country. Wherever Celotex Acoustical Products hush noise—in kindergarten, grammar school, high school and college, teaching and studying is made easy. Student failures and disinterest are greatly diminished—all because Celotex Acoustical Treatment endows schoolrooms with a permanent quiet.

CELOTEX ACOUSTICAL TREATMENT IS NECESSARY ECONOMICAL AID TO MODERN PROGRESSIVE SCHOOLS

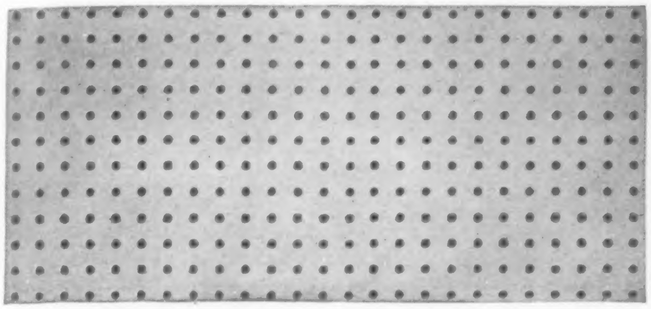
The roll call of American schools that have successfully relied on Celotex noise-quieting and acoustical correction in the past sixteen years is long and impressive. Whenever and wherever requested, The Celotex Corporation has gladly contributed its completely informative catalogs to schools and universities; and when convenient, speakers from the Celotex Acoustical Engineering Staff have been supplied to lecture on Architectural Acoustics.

In every part of the United States and in Canada (Dominion Sound Equipments, Ltd.) there is established an exclusive distributor for Celotex Acoustical Products. These independently owned and operated concerns provide prompt, efficient, and dependable service in analyzing acoustical problems, recommending the proper material and application, and submitting estimates. The manufacturer is able by this means to assure users of capable, conscientious responsibility for results. Though the cost of complete acoustical treatment of your entire school building may exceed present available funds, a start toward noise reduction can be made by using Celotex Acoustical Products at small cost in your most troublesome areas. Such areas may include the band practice room, typing rooms, certain corridors, or the gymnasium. Why not let us survey your school and suggest proper acoustical treatment where it is needed, with estimates for budget purposes?

WHEN LIGHT REFLECTION IS IMPORTANT BE SURE YOU CAN PAINT THE ACOUSTICAL MATERIAL YOU BUY

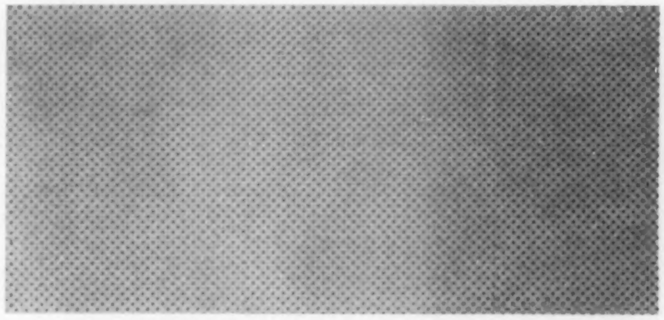
Painted Acousti-Celotex may be washed and cleaned to renew light reflection values until painting is necessary. Note how holes are always kept clear of paint, thus assuring constant and permanent maintenance of original noise-deadening properties

CELOTEX ACOUSTICAL PRODUCTS



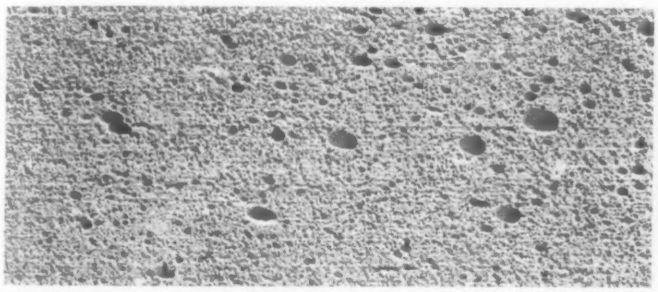
ACOUSTI-CELOTEX

ACOUSTI-CELOTEX (cane or mineral) acoustical tile possesses perforations of controlled diameter, depth and spacing, insuring uniform performance and practical paintability without loss of absorption

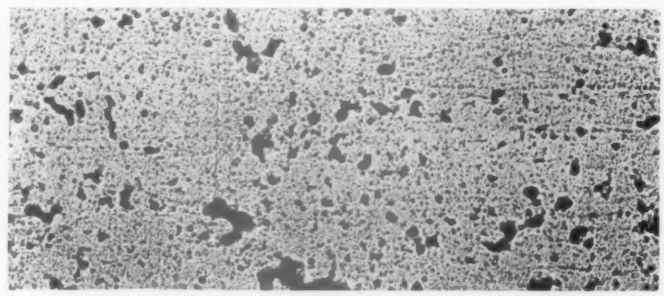


ACOUSTEEL-B

ACOUSTEEL is paintable, perforated steel tile enclosing a sound-absorbing element of incombustible mineral fibre

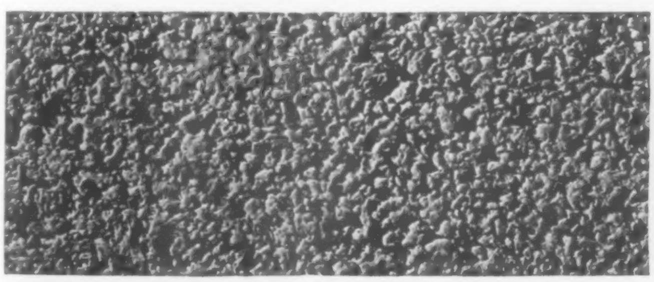


MUFFLETONE — Standard

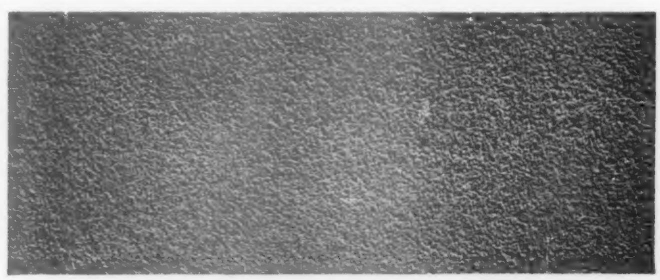


MUFFLETONE — Fissured

MUFFLETONE is the name of our precast, porous gypsum tile, available in a variety of integrally mixed, beautiful pastel colors

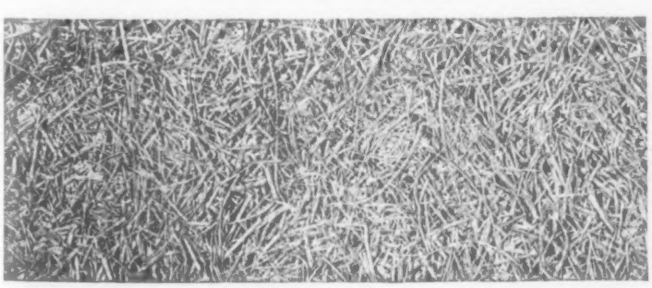


CALICEL



CALISTONE

CALICEL and CALISTONE—sound-absorbing artificial stone. In Calicel, the natural beauty of the expanded mineral aggregate is retained by means of a transparent binder; in Calistone, the Portland cement binding agent adds unusual moisture-proofness to the same porous mineral aggregate. Especially desirable for wall treatment



ABSORBEX

ABSORBEX is made of rugged wood fibres, protected and bound together with a fire-resistant binder

Q-T DUCTLINER

Q-T DUCTLINER is an acoustical material designed to absorb noise in air conditioning ducts. Made of mineral wool and a special binder in rigid block form, it will not smolder or support combustion

JOHN J. NESBITT, INC.

Manufacturers of

Heating, Ventilating and Air Conditioning Equipment

Holmesburg, Philadelphia, Pa.

11 Park Place, New York City

Today's Most Healthful Heating and Ventilating for the New or Remodeled School Building . . .

RESULT of years of scientific research and progress, the Nesbitt Syncretizer represents the most advanced thought on heating and ventilating the schoolroom. It brings in and distributes to the classroom a continuous supply of fresh, outdoor air, and syncretizes or harmonizes it with the room air so as to maintain a healthful, comfortable June-like condition, even when the outside temperature is below zero.

The Nesbitt Syncretizer

DRAFTLESS FRESH AIR WITHOUT OVERHEATING

Fully automatic, the Nesbitt Syncretizer prevents drafts, overheating and unpleasant odors. It is adjustable according to any State's laws to deliver all or part outdoor air, but always some outdoor air to occupied classrooms. Its special Air-Stream Minimum Temperature Control provides that all air taken from outdoors is first warmed to a safe minimum temperature, thus preventing drafts. The Room Temperature Control assures that the desired room temperature will be uniformly maintained without permitting overheating.

ENDURING BEAUTY — QUIET, ECONOMICAL PERFORMANCE

The Syncretizer's simple beauty is conformable to schoolroom needs; it is attractive but not obtrusive. Its velvety finish has restraint and long life. Tests have proved it to be the quietest of units. Its economy of fuel and current wins lasting favor.

A LEADER IN ITS FIELD

In competitive demonstrations before school boards, the Nesbitt Syncretizer has outsold all other unit ventilators, and is today the unit most frequently specified for new schools.

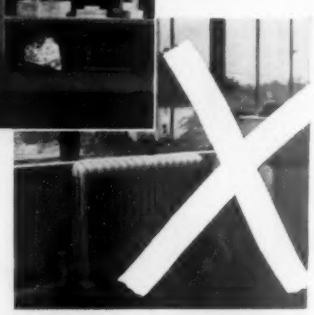
TRANSFORMING OLD SCHOOLROOMS

Recently Nesbitts have advanced the idea of rehabilitating old schools by a program of Nesbitt Modernization, suiting the particular needs of the individual school. Obsolete heating systems can be replaced or modernized. Nesbitt Syncretizers can be installed where units have never been used or to succeed old, outmoded ventilators. Earlier Nesbitt units can be modified by the installation of advanced mechanical features to give today's and tomorrow's better results. Savings of fuel and current often finance the improvement.

MODERN STREAMLINING

Neat, convenient storage shelves integrated with heating and ventilating units can bring a streamlined laboratory appearance to a cluttered classroom. Nesbitts now furnish their Syncretizers and auxiliary convectors in special casings when desired for combining pleasingly with standard or specially built storage units.

Do away with outmoded heating and ventilating equipment . . . get improved appearance, comfort and economy!



Factual data, including actual case histories of some of the thousands of old schools modernized by John J. Nesbitt, Inc., will be furnished upon request.

NESBITT Syncretized Air

PERPETUAL JUNE IN THE CLASSROOM

Nesbitt Syncretizers are sold by American Blower Corporation, and John J. Nesbitt, Inc. Complete information is contained in Publication No. 231-1. For engineering data, Publication No. 225.

PETROLEUM HEAT & POWER COMPANY

Main Office and Factory: Stamford, Conn.

Oil Burning Equipment—*"Since 1903"*—Fuel Oils

PETRO
Reg. U. S. Pat. Off.

INDUSTRIAL AND COMMERCIAL OIL BURNING SYSTEMS

"Cut Steam Costs for Schools and Universities"

Automatic boiler operation is the aim of cost-conscious management, but for various sound reasons, it may not be feasible in certain plants. Consequently, Petro burners are available for three general methods of operation:

AUTOMATIC—SEMI-AUTOMATIC—MANUAL

Petro's operating economies, proved every month in thousands of installations, are due to principles rather than "features" or gadgets. Experience-developed design for specific application, inherent simplicity, and traditionally fine manufacture are basic in Petro burners.

In automatic operation these are enhanced by two important factors in firing efficiency and fuel economy. These are:

(1) PETRO'S THERMAL-VISCOSITY CONTROL

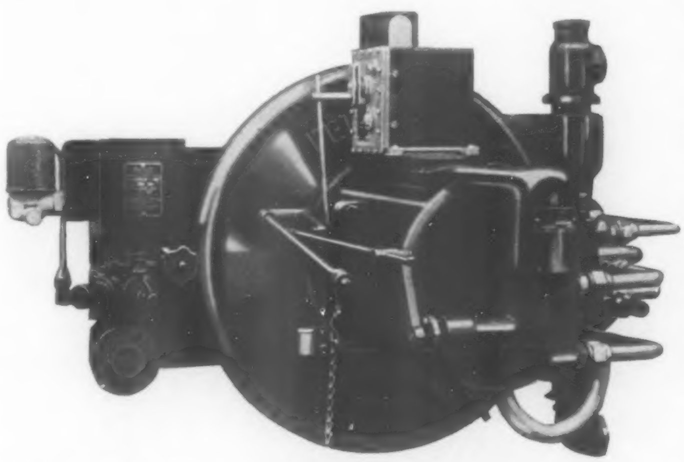
—a well proven system for burning No. 6 or Bunker "C" oil at maximum combustion efficiency under absolute control without any need for frequent manual adjustment—the only method of burning preheated oils which can be called "automatic" legitimately.

(2) MODULATED FUEL CONTROL

—a completely automatic control of high-low operation which permits automatic low fire starting and modulation or acceleration of firing to meet fluctuating steam demands:—maximum combustion efficiency at every stage of firing. Illustration shows modulating motor as mounted on burner (when specified) and arms and linkage through which constant fire-regulation is maintained.

SPECIFYING ENGINEERS will find it helpful to have complete information on these factors which so markedly affect operating costs. Petro Industrial Burner Catalogue may be found in "Sweets," or copy will be sent gladly on request.

MODEL W-DIRECT DRIVEN, ROTARY CUP TYPE BURNERS



This Burner is a self-contained assembly of motor, fan, pump, rotary cup atomizer and all air and oil adjustment apparatus. Illustrated above is a Petro Model W for Automatic operation on No. 6 (Bunker "C") fuel oil.

Interlocking air and oil control mechanism permits any minimum or maximum operation required within the burner's range of operation. Counter-flow Angular Air Vanes at nozzle increase air and oil turbulence and aid efficient combustion of heavy fuel oils.

Special oil adjustment valve meters oil to rotary cup, yet permits manual operation without disturbing permanent burner adjustment.

CAPACITIES

Model	Motor H.P.	Max. Gals. Per Hour	Rated Capacity Boiler H.P.	Sq. Ft. C. I. Steam Radiation *
W-2½	⅓	11	34	4,800
W-3	½	15	47	6,540
W-4	½	25	78	10,825
W-5	1	33	103	14,300
W-6	2	45	141	19,600
W-7	2	62	195	27,150
W-8	3	100	318	43,500
W-9	3	145	454	68,000

W-2½ to W-9 burns No. 5 fuel oil of 300 seconds maximum viscosity at 100° F. Saybolt Universal or any lighter oils without preheating. When heavier No. 5 or No. 6 (Bunker C) fuel oil is used, preheating is required. Models W-2, 2½, 3 and 4 burners, single phase 110 or 220 volt, 50 or 60 cycle. Model W-5 single phase, 220 volt, 50 or 60 cycle.

All models, 220, 440, 550 volt, polyphase, 50 or 60 cycle.

W-2 to W-8 belt driven type is available in 25, 30, and 40 cycle A.C. for all standard voltages, single or polyphase; also 115-230 volt D.C.

(*) Equivalent Direct Cast Iron Steam Radiation measured at the boiler outlet.

Removable rotary cup and nozzle permits changing shape of flame to suit requirements of any boiler and prevent flame impingement.

Oil pump is a slow speed, permanently packed, self-priming, self-aligning, non-binding or clogging mechanism, assembled as an integral part of burner. Burners also available without integral pump. Motor is cooled by induced circulation of air. Armature shaft is mounted on two deep-groove annular ball bearings. Splash lubrication from the sump which is below the pump drive, lubricates all bearing surfaces in the burner.

OTHER PETRO OIL BURNING EQUIPMENT

Industrial: All generally accepted types of industrial fuel oil burners, for various special types of application and service, are included in the complete line of Petro Industrial Equipment.

Domestic: Oil burners for general application to installed domestic heating plants. Specially designed burners for specific makes and sizes of boilers or furnaces.

Automatic oil fired steel domestic heating boilers, up to 575 sq. ft. E.D.R. Steam.

Instantaneous Water Heaters burning No. 3 oil, capacity 120 gallons water per hour, 100 degree temp. rise.

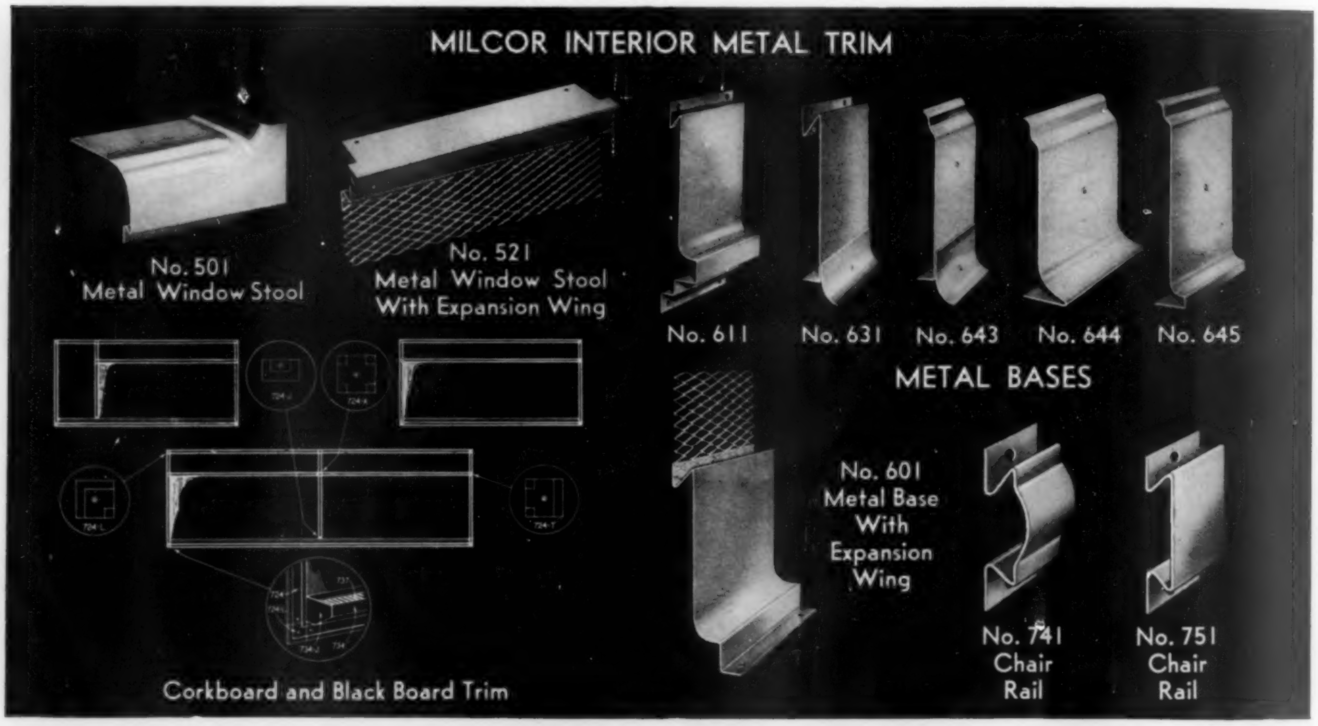
High Pressure boilers up to 25 H.P. automatically oil fired.

Catalog on request.

MILCOR STEEL COMPANY

4153 West Burnham Street, Milwaukee, Wisconsin

Canton, Ohio / Chicago, Illinois — Kansas City, Mo. / Rochester, N. Y. — New York City / Baltimore, Md.



METAL TRIM OF UNSURPASSED BEAUTY AND DURABILITY NOW AVAILABLE WITH INSULMAT SOUND DEADENING

- METAL BASES
- METAL COVE MOULDS
- METAL CHAIR RAILS
- METAL BLACKBOARD MOULDS
- METAL CHALK TROUGH

Milcor Metal Trim is the finest interior trim available for modern school construction. Permanence, fire-safety, and resistance to abuse are a few of the reasons why this line has been specified in representative school construction in all parts of the country. Its attractive appearance and exceptional sanitation make it especially adaptable to school use. Every desirable type of interior trim may be found in the complete Milcor line.

The Expansion Wing, which is an optional feature of many Milcor Metal Trim products, provides a permanent plaster bond, preventing checking and cracking of plaster at vulnerable points. And in schools, especially, it is desirable to preserve the original plastered surface.

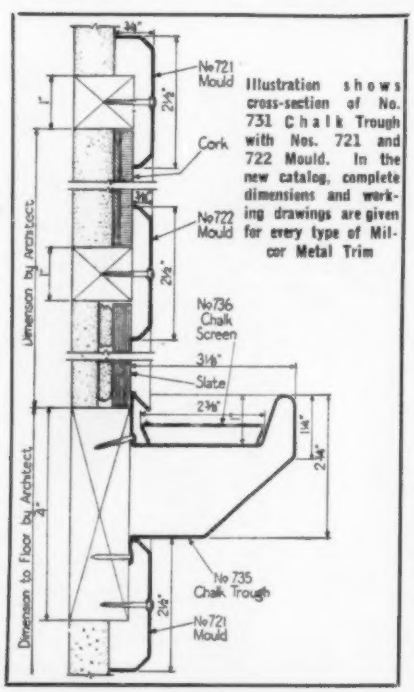
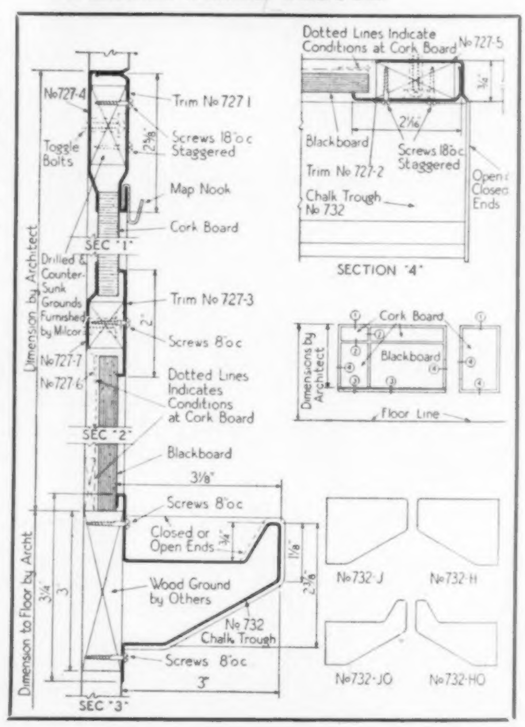


Illustration shows cross-section of No. 731 Chalk Trough with Nos. 721 and 722 Mould. In the new catalog, complete dimensions and working drawings are given for every type of Milcor Metal Trim

Illustration at right shows cross-section view of No. 727 Series Cork Board and Blackboard Trim

Write for the 100-D Milcor Metal Trim Catalog—also for data on Sound Deadening



MILCOR PRODUCTS FOR SCHOOLS

MILCOR VENTILATORS AND SKYLIGHTS

The Milcor "Nu-Air" is a steel top syphon Ventilator. Breakers and deflectors inside the wind band produce positive suction regardless of wind direction, and insure against back draft at all times. Its design takes into consideration all influencing conditions and compels it to function at all times.

The Milcor "Spinner" Ventilator has great exhaust capacity. The slightest breeze keeps it operating efficiently. As the head revolves, the air in the ventilator is expelled creating a vacuum which draws the impure air from the building. Down drafts are an impossibility with this construction.

The Milcor Line of Skylights covers all types and sizes. We furnish recommendations to meet special requirements.

Send for literature describing and illustrating Milcor Ventilators and Skylights

MILCOR FIRE-PROOF BUILDING MATERIALS

There is no better plaster base for walls and ceilings of school buildings than metal lath. Its scientifically designed mesh gives it a positive plaster grip. There is no plaster waste with this lath, and yet every inch of wall surface is locked permanently into place.

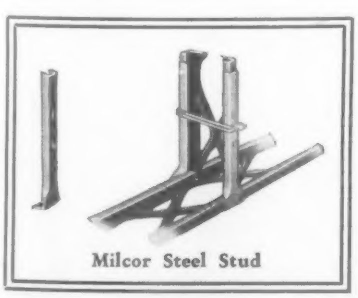
Expansion Casing provides a practical door and window trim. The flush-type junction of wall and casing insures a sanitary finish, with no cracks to become clogged with dirt.

Milcor Expansion Corner Bead is made for outer and inner angles, and its precisely true nose makes a neat, safe, straight line corner. The Expanded Wing, an integral part of the bead, permits the plaster to key through and form a strong bond with the lath beneath, protecting against corner cracks either from blows or strain due to settling.

Write for the Milcor Manual—for complete information on Fireproof Products

MILCOR PARTITION SYSTEMS

These two systems are important contributions to fire-proof construction. The ease in which they can be constructed reduces labor cost considerably and at the same time makes possible partitions of exceptional rigidity and permanence. Certified fire-resistance makes them the partitions for school construction.



Milcor Steel Stud

MILCOR STEEL STUD FOR HOLLOW PARTITIONS

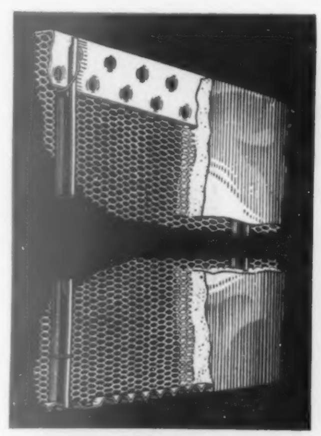
Sound resistance, insulating value, and resistance to shocks and abuse are a few of the outstanding advantages of this system. Write for detailed literature.

MILCOR SOLID 2-INCH PARTITION AND FURRING SYSTEM

Only four units comprise this system:

1. Ceiling Angle Runner
2. Slotted Channel Stud
3. Continuous Crimp Floor Runner
4. Milcor Metal Lath

Its labor saving simplicity reduces cost and speeds construction. Detailed literature supplied upon request.



Milcor 2" Solid Partition and Furring System

STREAMLINE PIPE AND FITTINGS DIVISION

MUELLER BRASS CO.

Port Huron, Michigan

PROTECT THE INVESTMENT FOR THE LIFE OF THE BUILDING BY INSTALLING *STREAMLINE* COPPER PIPE FOR THE PLUMBING AND HEATING SYSTEMS

STREAMLINE bronze solder fittings and copper pipe are a radical departure in conducting systems for plumbing, heating or industrial use. Their unique method of connection has made it possible to use copper piping of hard temper and of a sufficient wall thickness to meet all requirements of actual service. This is in direct contrast to threaded copper pipe, which had to carry a very heavy wall to insure a sufficient thickness to meet service conditions after this thickness had been cut away approximately 50% in the fabrication of the thread. Threaded copper pipe for this reason is naturally very expensive and gives no extra service for its additional wall thickness on the unthreaded portion.

STREAMLINE Solder Fittings are manufactured under U. S. Patents 1,770,852; 1,776,502; and 1,890,998

Illustrating Mechanical Features of the STREAMLINE Fitting

STREAMLINE solder fittings and copper pipe are installed at a price very slightly in advance of rustable materials.

STREAMLINE fittings and copper pipe are ideal for use in all types of educational buildings for all general plumbing and heating purposes: for steam supply, condensate return, cold water, drinking water supply and return, and hot water supply and return piping. Among the many advantages are:

No rusting or clogging—No discoloration of water from scale or rust, nor any decrease in volume or pressure such as is invariably found after a few years with corrodible materials.

Light Weight, yet great strength—The STREAMLINE solder fitting, less heavy and consequently less expensive for any given size, produces a connection that is enormously strong and leakproof.

Minimum space required—Although STREAMLINE solder fittings produce enormously strong joints, they are very little larger than the pipe lines which they connect. They do not protrude like screw type fittings. Since these fittings are not screwed into place when connected to the pipe and no space is required for wrench handling, etc., they can be installed very close to each other, thus saving considerable space.

Leaks due to vibration eliminated—Constant vibration has no effect on a joint made with STREAMLINE solder fittings. Its effects are not localized as is the case with screw type fittings, but are harmlessly dissipated throughout the system.

Visual proof an exclusive feature of the STREAMLINE Fitting.—When the mechanic installs STREAMLINE he can tell at a glance that the joint he has made is permanently leakproof without an actual pressure test. This is a valuable asset especially in concealed work.

The STREAMLINE solder fitting is not connected by threading or flaring but by soldering, utilizing one of nature's laws—capillary attraction—to form a permanently tight joint of great strength. The joint, in contrast to threaded connections, is actually reinforced and is the strongest point in the line, instead of the weakest.

Cut-away Sectional View of STREAMLINE Tee. Note How Pipe Is Recessed Into the Fitting, Resulting in a Uniform Smooth Waterway

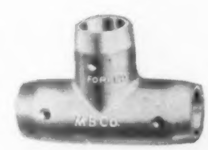
The illustration herewith shows the mechanical features of the STREAMLINE solder fitting. After the joint has been fluxed and assembled in the pipe, it is heated and solder introduced through the feed hole. Capillarity immediately distributes it thoroughly and evenly between the bonding surfaces, producing a joint so strong that in a pulling test, the pipe will actually break while the joint remains without the slightest damage. It requires over 9000 pounds of pull even before the fracture in the pipe occurs. This, of course, is away beyond anything required of it in actual service.

ESPECIALLY RECOMMENDED FOR HEATING PLANTS

STREAMLINE hard copper pipe and fittings are particularly recommended for all heating plants—whether by hot water or steam—a special virtue of copper pipe being its capacity to hold heat with a minimum of radiation, yet to conduct it very rapidly, so that there is a minimum loss of heat when being conveyed from the point of generation to the points of distribution. Since copper cannot rust, the original delivering capacity of STREAMLINE pipe remains the same indefinitely. In all heating plants, we claim greatly increased benefits in all installations made with STREAMLINE, with noteworthy savings in both fuel and material.

Coupling

STREAMLINE pipe and fittings are installed in over four hundred schools and colleges throughout the United States and, in fact, in every type of building construction. They have been specified by leading architects everywhere.



Tee

Elbow

STREAMLINE fittings are furnished in complete range from ¼″ to 10″.

The word STREAMLINE is the Registered Trade Mark of the Mueller Brass Co., Port Huron, Michigan

Cross

Write for Catalog F.

THE RIC-WIL COMPANY

Underground Conduit Systems for Heating and Power Pipes

Union Commerce Building, Cleveland, Ohio

AGENTS IN PRINCIPAL CITIES

Ric-wiL Interlocking Conduit and Base Drain Foundation, Tile and Cast Iron; Ric-wiL Insulated Pipe Units; "Dry-paC" Waterproof Asbestos Con-

RIC-WIL

duit Insulation; Roller Pipe Supports; Alignment Guides; Manhole Covers; Asphalt Impregnated Filter Tape.

Ric-wiL Interlocking Tile Conduit is first quality, vitrified tile of the bell and spigot type. It is shipped in full round sections and split into top and bottom halves as used. Tile is A.S.T.M. double strength, reinforced top and bottom. When installed, bell and special Loc-liP side joints are sealed with portland cement. Loc-liP joint (see cut) is shaped so that cement locks top and bottom halves giving conduit extraordinary rigidity and strength. Leakage is practically impossible.

Sections are all in 2-ft. lengths, sizes from 4 to 27-in. inside diameter. The 27-in. size has sections 2 ft. 6 in. long. Every sixth section has an opening in the bottom half through which a pipe support of the roller type projects to carry the steam, hot water or oil pipes, making pipe supports independent of conduit itself. This opening is closed with cement which reinforces pipe support.

Ric-wiL Interlocking Base Drain Foundation is both a base for supporting and lining up conduit and drain for carrying away water. Top of base drain has slot into which the bell of conduit fits, making sections of conduit and base drain stagger with each other. Pipe support saddles resting on the side shoulders insures perfect pipe alignment.

Cast Iron Ric-wiL Conduit—For extra heavy duty under railroads or where conduit is subject to very heavy loads, Ric-wiL is made of cast iron. Has Loc-liP Joint and "interlox" with tile Ric-wiL—made in all 5 types described in next column. Special heavy duty tile or a cast iron base drain is used with Ric-wiL Cast Iron Conduit.

Dry-paC Waterproof Insulation—A high-grade fibre asbestos processed insulation that is permanently water repellent. Of unusually high efficiency and great natural strength, it will not slump away from pipes and is non-corrosive. Samples sent on request.

Systems Meet All Conditions—Type F System—For steam power and superheated steam. Conduit assures super-efficiency insulated with Dry-paC or Ric-wiL No. 11 Asbestos Insulation, packed around pipes in closed construction.

Type SPC System—For steam heating, power pipes and superheated steam. Insulation is any standard make of sectional pipe covering, kind and thickness depending upon service to be rendered. Internal drainage is provided in this type.

Type DA System—For hot water, oil transmission and condensation returns. Tile and insulation in one, the latter, a diatomaceous earth mixture of high insulating quality, moulded inside the tile and keyed in. This type insulates the pipes from surrounding ground but not from each other, making it specially adapted to carry oil and steam pipes together for oil transmission. Exceptionally easy to install.

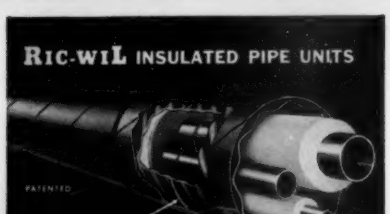
Type DF System—For steam heating, power pipes and superheated steam. This is Type DA with the addition of Ric-wiL Asbestos Conduit Filler to be packed around pipes at a density specified by manufacturer. Filler is a good non-conductor which will not corrode the pipes nor shrink. Dry-paC furnished when specified.

Super-Tile Conduit—To support any overage traffic load, or for use in extra wide or deep trenches. Details on request.

Insulated Pipe Units

These pre-sealed factory-built Units come in standard or special lengths for underground or outside overhead work. Complete with steam pipe, insulation, fittings, pipe supports, expansion loops, watertight glands, and all accessories. Armco Hel-Cor Conduit used has thick asphalt coating (of special quality, made to Ric-wiL's own formula) and protective wrapping to meet specific conditions and to resist all deterioration. Choice of insulation including Dry-paC or sectional pipe covering. Connection between units is made either with split connector band, or welded, as preferred. Exceptional strength and durability assured. A complete pre-fabricated system, ready to install in minimum time. The ideal modern method for steam, hot water or oil lines on any type of work where speed and economy are demanded. Write for Catalog.

Engineers: Write for layout and specification Manual 420A.

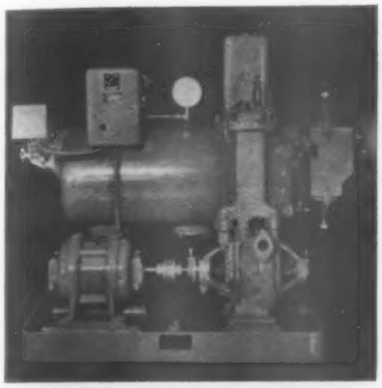


Ask for Catalog 41 showing all Ric-wiL Systems

THE NASH ENGINEERING COMPANY

222 Wilson Road — South Norwalk, Conn., U. S. A.

SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES

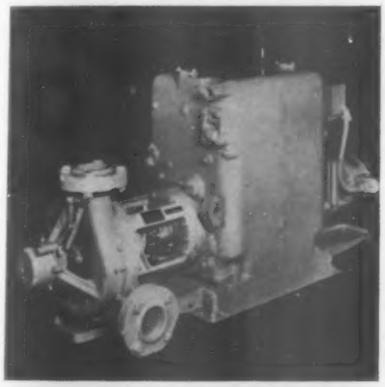


JENNINGS RETURN LINE VACUUM HEATING PUMPS

Standard with the heating industry for over sixteen years. Jennings Pumps remove air and condensation from the return lines of vacuum steam heating systems, discharging the air to atmosphere and returning the water to the boiler.

Two independent pumping units are combined in a single casing—an air unit which handles only air, and a water unit which handles only water. The capacity of each unit is simultaneous capacity. Each handles the full rated capacity independent of the other. Impellers of both are mounted on the same shaft. The pump is bronze fitted throughout.

Supplied either direct connected to standard electric motors, for belt drive, or for steam turbine drive. For continuous or automatic operation against pressures up to 40 lbs. Supplied standard in capacities up to 300,000 sq. ft. E.D.R. Bulletins on request.



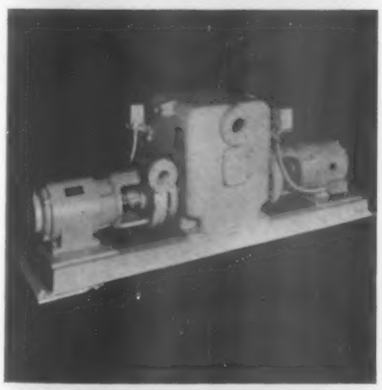
JENNINGS VAPOR TURBINE VACUUM HEATING PUMPS

The Jennings Vapor Turbine Heating Pump combines all of the advantages of the Standard Jennings Return Line Heating Pumps with a new type of drive, a specially designed low pressure turbine which operates directly on steam from the heating mains on any system, requiring a differential of only 5 in. of mercury, and returns that steam to the heating system with practically no heat loss.

This pump affords the economy which goes with a continuous condensation return and steady vacuum, and at no cost for electric current.

The Jennings Vapor Turbine is a safe heating pump, for it functions as long as there is steam in the system, entirely independent of electric current failure. Ideal for Greenhouse, School, and Hospital service.

Furnished standard in capacities up to 150,000 sq. ft. E.D.R. Bulletin on request.



JENNINGS CONDENSATION PUMPS

Jennings Condensation Pumps remove condensation from radiators in return line steam heating systems and pump condensation back to the boiler.

Jennings Condensation Pumps are sturdy and compact in construction, and combine receiving tank, pump and driving motor in a single assembly. Bronze fitted throughout, with Tobin bronze shaft. Impeller is of special design adapted to handling hot water with highest efficiency.

They efficiently remove condensation from radiators, particularly those set below the boiler water line level. Pump casing forms part of return tank, making a compact structure that conserves floor space. Rectangular construction permits installation in corner or against wall.

Jennings Condensation Pumps are furnished in standard sizes with capacities ranging from 1½ to 225 g.p.m. of water, for serving from 1,000 to 150,000 sq. ft. equivalent direct radiation. Bulletin on request.

JENNINGS SUMP AND SEWAGE PUMPS

The Jennings Suction Sump Pump is a self-priming centrifugal pump for handling seepage water and liquids reasonably free from solids. The Suction Sewage Pump is fitted with a non-clog type impeller. Pumps are mounted entirely above the sump where they are always readily accessible. Only the suction pipe is submerged.

There are two moving parts: the centrifugal impeller and the vacuum priming pump rotor. Both rotate without metal-to-metal contact in the casing. Both are mounted on the same shaft that carries the rotor of the electric driving motor, making a compact assembly.

These pumps may be installed away from the pit, or directly over the pit. The Pedestal Type Jennings sets directly on the pit cover, requiring no other foundation.

Capacities and heads to meet all requirements. Bulletins on request.

ATHEY COMPANY

6034 West Sixty-Fifth St.

Chicago, Illinois

PERENNIAL WINDOW SHADES
ATHEY DISAPPEARING SKYLIGHT SHADE

Athey Perennial

CLOTH-LINED METAL WEATHERSTRIPS
ATHEY SEALTITE CAULKING COMPOUNDS

Information and prices on request

ATHEY PERENNIAL WINDOW SHADES

Athey Perennial Window Shades are ideal for use in school and college buildings of all kinds, for, being translucent, the shades with the sun on them throw a soft light over the room, giving sunlight without glare, and conserving the eyesight of the pupils.

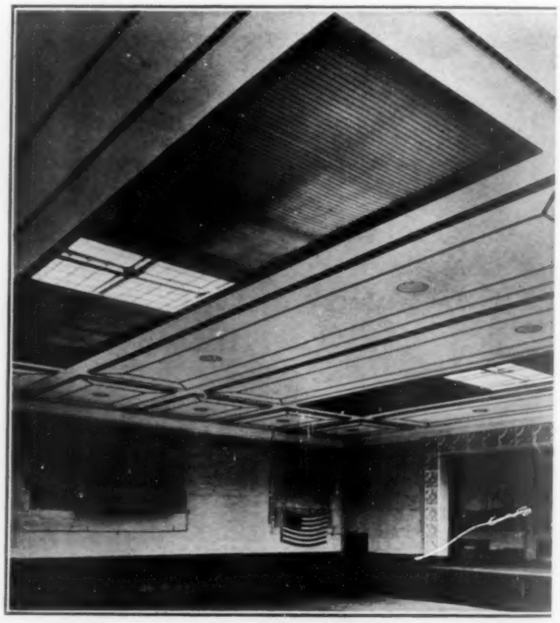
Being instantly adjustable to cover any part of the window necessary, they permit the windows being opened at both top and bottom, insuring better room ventilation, and, operating on bronze guide wires, flapping of shades when window is open is eliminated.

Made of the strongest and most durable material ever used for shades, they last longer than other shades, so on a cost per year basis are the most economical shade obtainable.

They are exceptionally attractive with their cockle finish and pleats, coming in a choice of several colors, and in widths up to seventeen feet.

The black opaque shades are useful for darkening assembly rooms and classrooms for motion picture projection.

Schools, colleges and auditoriums find Athey Shades ideal for skylights, too — the translucent shades for protecting against glare and heat, and the black shades for darkening rooms for motion pictures.



National College of Education, Evanston, Ill.
Equipped with Athey Shades

Write for catalog.

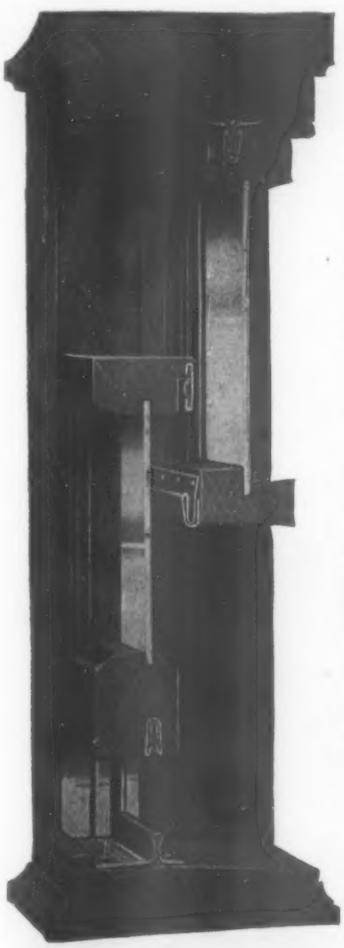
A Few of the Hundreds of Prominent Schools and Colleges Using Athey Shades:

St. Francis Academy	Joliet, Ill.
Saginaw High School	Saginaw, Mich.
State Normal College	Cortland, N. Y.
Junior Senior High School	Rye, N. Y.
Adelphi College	Garden City, N. Y.
The Choate School	Wallingford, Conn.
Wm. Penn Charter School	Philadelphia, Pa.
Henry Schaf School	Parma, Ohio
Solomon Juneau School	Milwaukee, Wisc.
Bisbee Public School	Bisbee, Ariz.
University of S. C.	Columbia, S. C.
Arlington School	Spokane, Wash.
University of Hawaii	Honolulu, T. H.
National College of Education	Evanston, Ill.
Nazareth Academy	Kalamazoo, Mich.
Junior High School	Ann Arbor, Mich.
Colt Memorial High School	Bristol, R. I.
Junior-Senior High School	Louisville, Ky.
Steuben High School	Milwaukee, Wisc.
University of Detroit	Detroit, Mich.
Toledo University	Toledo, Ohio
University of Nevada	Reno, Nev.
National College of Education	Evanston, Ill.

ATHEY WEATHERSTRIP

ATHEY Cloth Lined Metal Weatherstrip, the only weatherstrip using the cloth to metal feature, has been on the market for over 28 years. It has been installed on many of the best and largest buildings in the United States and Canada for owners and architects who desire the best, even though the initial cost is higher than for ordinary weatherstrip. Of our early installations we can point to St. Anthony's Hospital of St. Louis and the Blackstone Hotel of Chicago, who are still obtaining the maximum of efficiency after twenty-seven years of service, making the yearly cost low in comparison with cheap, ordinary weatherstrip.

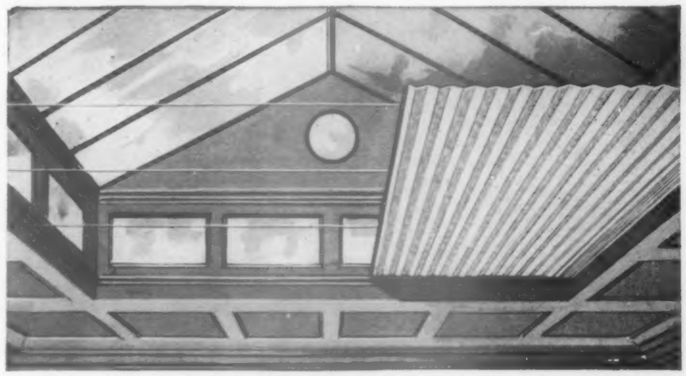
Unlike the ordinary channel used in many two-piece strip installations, the Athey channel is double the ordinary width and lined with a cloth material manufactured especially for this purpose, which not only prevents all air leakage but is a dust-proofing and sound-proofing as well. Rail members are also backed with felt, which prevents leakage at the jamb, a common weakness in ordinary weatherstrip installations due to infrequent nailing of the rail member. All cloth and felt used is chemically treated, guarding against rot and deterioration, so this part of the weatherstrip, as well as the metal, is guaranteed for the life of the building. The best grade of sheet zinc is used on all strip.



No drafts, rattling of sash when Athey strip is used, and the cost of your installation will be repaid in coal savings in from two to three years. Athey Weatherstrip is installed by authorized representatives with trained workmen. Write us for catalog and name of nearest dealer.

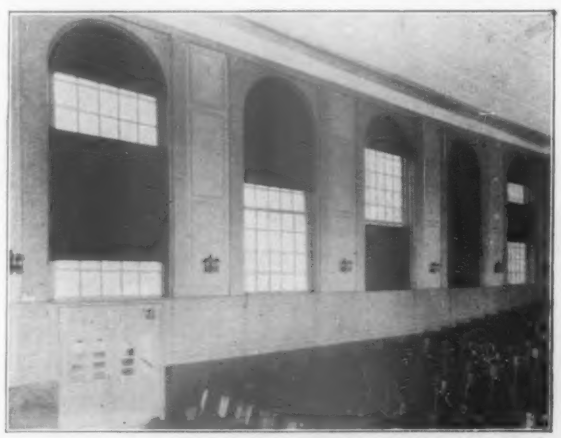
A few of the many Schools and Colleges using Athey Weatherstrip:

Streator High School, Streator, Ill.
Western Reserve Academy, Hudson, Ohio
Purdue University, Lafayette, Ind.
Cattaraugus School, Cattaraugus, N. Y.
Johns Hopkins University, Baltimore, Md.
Wesleyan University, Middletown, Conn.
Woodlawn High School, Birmingham, Ala.
Lincoln School, Great Falls, Mont.
Sandia School, Albuquerque, N. M.



Athey Skylight Shades

School lunchroom equipped with Athey Shades



Black Shades in use in Lexington High School, Lexington, Mass.

SEALTITE CAULKING

Knife or gun grade. Permanently elastic, impervious to heat or cold, adheres to wood, stone or metal, stainless. Standard colors white and gray, special colors to order. Approved by U. S. Bureau of Standards for government use. ***Write for Illustrated Booklet.***

COLUMBUS COATED FABRICS CORPORATION

DEPARTMENT U

Columbus, Ohio

For Wall-Tex Fabric Wall Covering, see Sweet's File Index

BONTEX
WASHABLE
SHADE CLOTH

This is an actual swatch of Bontex Shade Cloth. It is made from high-thread-count muslin impregnated with durable pyroxylin. It is scrubbable with soap and water, is colorfast to sun's rays, resists rain, snow and wind, withstands rough handling. Superior for all window shade installations. Exceeds Federal specifications CCC-C-521a for shade cloth.

TEST THIS BONTEX SAMPLE

Clip off Bontex swatch at dotted line and place in boiling water for one-half hour. Remove Bontex swatch—twist it, crush it, *treat it rough.* Then hold to light. Positively no fading, pinholing, cracking or fraying!

Bontex No. 202

Wide Range for Every Window Shade Need

Bontex comes in 27 colors, patterns and designs for a wide range of utility and decorative needs and provides three distinct types of shade cloth—translucent, semi-opaque and opaque. Bontex **translucent** lets in maximum light without glare. Bontex **semi-opaque** provides a softer, more diffused light. Bontex **opaque** —absolutely black—excludes all daylight.

Bontex Quality Means a Real Saving

Whether you are interested in shade cloth for properly controlling daylight in homes, schools, hospitals, institutions, commercial or public buildings, Bontex readily fits into your ideas for modern economical planning. Its extreme durability and lasting beauty provide longer service at lower cost per year. Bontex quality saves money and gives greater satisfaction.

Bontex Is Pyroxylin-Impregnated, Waterproof, Colorfast—Will Not Pinhole, Crack or Fray

Bontex pyroxylin-impregnated shade cloth is impervious to water, grit and grime. It is also colorfast and will not pinhole, crack or fray—as proved by impartial scientific tests. **(See boiling test, first column.)** As a result, Bontex gives longer service and keeps its like-new appearance for years.

Withstands Scrubbing More Than 20 Times

Bontex can be scrubbed with soap and water more than 20 times for removal of soiling, including stains, and will retain its original finish. This is but another example of Bontex's rugged durability—its genuine through-and-through quality.

Conforms to Rules of Eyesight Conservation Council

Bontex provides tempered sunlight—toned down to the right intensity—for less eyestrain in schools, for more restfulness of patients in hospitals, for higher efficiency in laboratory or office and for greater comfort in the home. Bontex translucent, semi-opaque and opaque shade cloths all conform to rules of the Eyesight Conservation Council and have proved their complete satisfaction in the nation's finest schools.

EDWARD MALLINCKRODT SCHOOL, 6012 PERNOD AVE., ST. LOUIS, MO.

Write for Free Sample Book

Get this handy sample book at once — sent to architects on request. Shows the complete Bontex line of 12 plain colors, 5 beautiful corded designs, 5 duplex colors and 5 modern printed patterns. Translucent, semi-opaque and opaque types.

STEWART HARTSHORN COMPANY

ESTABLISHED 1860

250 Fifth Avenue, New York, N. Y.

BRANCHES

AMERICAN SHADE CLOTH COMPANY
Merchandise Mart, Chicago, Ill.

AMERICAN SHADE CLOTH COMPANY
55 East Spring St., Columbus, Ohio

CALIFORNIA SHADE CLOTH COMPANY
210 Bayshore Blvd., San Francisco, Cal.

STEWART HARTSHORN COMPANY
1437 Randolph St., Detroit, Mich.

WINDOW
SHADE
CLOTH

WINDOW
SHADE
ROLLERS

Hartshorn DIANA CLOTH

Washable

Use pyroxylin-impregnated, finest quality, washable Diana cloth for shades in all types of school and college buildings. Wash with soap, water and scrubbing brush. Hartshorn offers a complete line of attractive colors, solid, duplex and striped—translucent and semi-opaque. 144 to 152 threads to the square inch. Hartshorn Diana cloth for window shades conforms to Federal Specification CCC-C-521A.

Hartshorn SPRING SHADE ROLLERS

STANDARD SINCE 1860

Controlling the manufacture of our own wire accounts for the fact that Hartshorn springs do not break down. They stand the gaff of heavy and constant school use.

Both wood and metal rollers are manufactured by Hartshorn. For schools, metal rollers should be specified because of their sturdy construction and excess spring power, added to the fact that they can be used again and again with new sets of shades.

WRITE FOR COMPLETE 16-PAGE CATALOGUE—NO OBLIGATION

AMERICAN MASON SAFETY TREAD CO.

GENERAL OFFICE AND FACTORY

Lowell, Mass.

Description: A metal plate of Iron, Bronze or Aluminum impregnated with abrasive grains or flint-like particles projecting above the surface, presents a Non-Slip stair tread both durable and safe under all conditions.

Application: Stair treads and platforms for new or old construction, ramps, door and elevator saddles, floor plates, trench covers, and spiral stair treads.

Assistance: Solution of stair and slipping hazard problems gladly suggested.

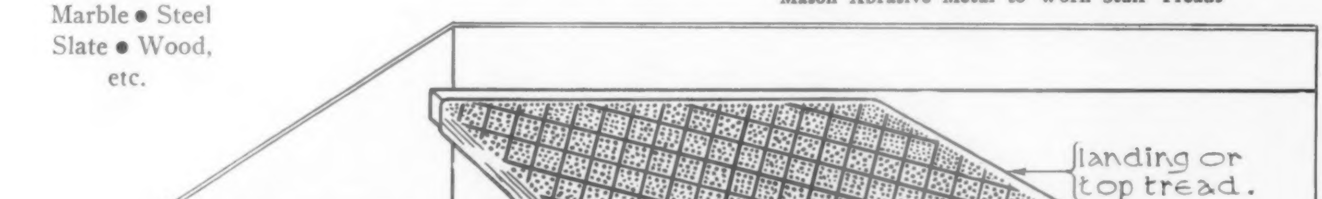
Advantages: Painful accidents on new or worn stairs can be prevented economically by application of Mason Abrasive Iron or Mason Ribbed Type Safety Treads.

Mason Safety Treads are used by Educational and Religious Institutions, in Public Terminals, and Industrial Plants, etc.

Mason Safety Treads are recommended by leading Architects, Safety Engineers and Insurance Companies.

Suitable for
Marble • Steel
Slate • Wood,
etc.

Recommended Method of Applying Mason Abrasive Metal to Worn Stair Treads



Mason
Products
Are Guaranteed

Mason Products
— • Include • —
Safety Stair Treads.
— • Abrasive Metal Type • —
Mason Abrasive Iron.
Mason Abrasive Bronze.
Mason Abrasive Aluminum.
— • Ribbed Type • —
Steel, Abrasive or Lead Filled.
Brass, Abrasive or Lead Filled.
Aluminum, Lead Filled.

Karbolith Underfilling and Flooring.
Mason Stair Nosings and Edgings.
Mason Safety Ladder Shoes.
Mason Extruded Thresholds.

CELEBRATING
OVER 50 YEARS OF SERVICE
TO MANKIND
PREVENTING STAIR ACCIDENTS
Catalogue and Samples
Supplied without obligation

· · · AGENTS IN PRINCIPAL CITIES · · ·

THE SAFE TREAD COMPANY

Manufacturers of

— "SAFE TREAD" —

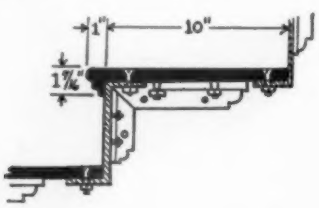
30 Vesey St., New York City

AGENTS IN PRINCIPAL CITIES

The Improved Abrasive Impregnated Iron, Bronze and Aluminum Safety Tread

The Vitrified Ceramic Abrasive Anti-Slip Tile, and Aggregate for Terrazzo, in 16 Colors

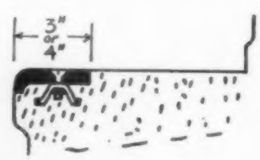
The necessity of providing slip-proof walkways for the safety of children and teachers has been established by the courts.



STYLE N5—FOR NEW CONSTRUCTION

Maintenance costs are likewise of utmost importance.

The use of "Safe Tread" Stairtreads—Door Sills, Platforms, Landings, etc., for new construction or repairs to existing walkways will insure the highest degree of **Nonslip** qualities and the greatest amount of **wearability.**

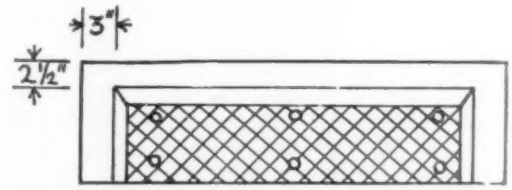


STYLE XL NOSINGS—FOR NEW CONCRETE

When Ordering or Requesting Quotation

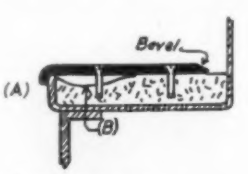
Specify iron, bronze or aluminum Safe Tread—style nosing desired, width **overall** or **back of nosing** width, length, surface design (see below), quantity of each size. If unusual shapes are required, furnish detail sketch or template. If for repairs, advise what type material is being covered and sizes wanted.

Submit your walkway problems to us; we shall be glad to help you solve them.

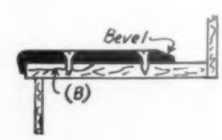


STYLE L—LIP ALONG FRONT EDGE, BEVELED BACKS AND ENDS

Recommended practice for repairs carry new tread to within 2½" of back edge of existing step and to within 3" of side of existing step.



Concrete or Pan Filled

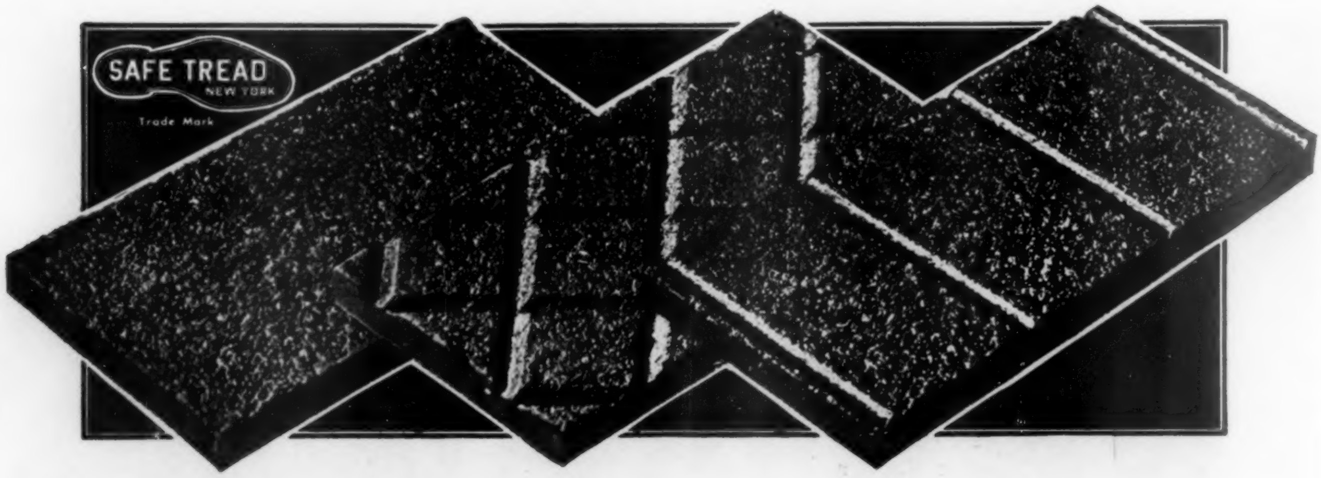


Wood, Marble or Stone

STYLE L—FOR REPAIRS

(A) ¼", ½", ¾", 1" or 1½", whichever required to cover worn area.

(B) Fill worn spots (B) with cement before putting new treads in place.



THE TEXAS COMPANY

Manufacturers of

TEXACO ASPHALT SHINGLES and ROOFINGS

TEXACO ROOFING DEALERS EVERYWHERE East of the Rockies

The Texas Company — Texaco Roofing Products — District Offices:

Atlanta, Ga.	Dallas, Texas	Houston, Texas	New Orleans, La.
Buffalo, N. Y.	Denver, Colo.	Minneapolis, Minn.	New York, N. Y.
Chicago, Ill.			Norfolk, Va.

Texaco Roofing Products also distributed by Indian Refining Co., Indianapolis, Ind.

FACTS ABOUT TEXACO ASPHALT ROOFING FOR INSTITUTIONAL USE

Economical: Dollar-for-dollar, today's Texaco Roofing buyer gets a better, longer-life roof than ever before.

Attractive: Texaco Asphalt Shingles are available in colors and patterns that will blend with and enhance the beauty of the buildings they cover.

Fire-resistant: The Fire Underwriters' Label of inspection is on every bundle. A fire-resistant Texaco Roof may even permit a reduction in insurance rates . . . dependent, of course, on local conditions.

Water and weather-resistant: The reason is self evident . . . asphalt is one of the greatest weather and water-proofing substances in the world today.

Meets rigid requirements: Texaco Roofing Products meet U. S. Army, Navy and other governmental specifications—have proved their ability to meet or exceed structural specifications for educational buildings, both for new work and re-roofing.

Most popular type: U. S. Department of Commerce statistics show that asphalt roofing products are America's favorite over all other types.

Reputation of integrity: Texaco Roofing Products maintain the standards of quality and dependability established by each of the more than 350 petroleum products manufactured by The Texas Company.

Quickly available: The widespread distribution facilities of The Texas Company, through the local Texaco Roofing Dealer, assure prompt deliveries and helpful cooperation.

★ ★ ★

FOR SAMPLES, COLORS AND SPECIFICATIONS SEE THE NEAREST TEXACO ROOFING DEALER OR WRITE TO THE NEAREST OFFICE OF THE TEXAS COMPANY.

ONE OF MANY SCHOOL BUILDINGS ROOFED WITH TEXACO STRIP SHINGLES. The Junior High School at Henryetta, Oklahoma. Texaco shingles add beauty and color, and assure years of economical protection.

SEND FOR *FREE* COPY OF THIS VALUABLE ROOFING DATA BOOK

68 pages of facts, diagrams, specifications, application methods—everything you want to know about asphalt roofing products. Write to The Texas Company, Roofing Division, Dept. ASU, 135 East 42nd St., New York, N. Y.

E & E MANUFACTURING COMPANY

Fisher Building
Detroit, Michigan

EVACUATORS

For Evacuating Pupils and Teachers from Burning School Buildings

Series P—For Permanent Installation

Chute pack is mounted in metal frame on a swinging arm. No physical effort is required to swing EVACUATOR into place.

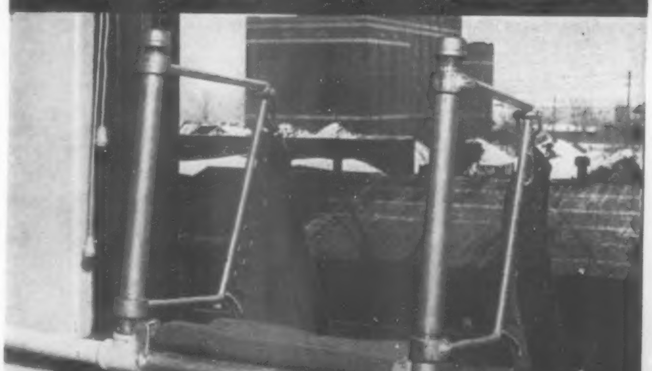


Photo shows top end of chute. Hinged "wings" permit chute to be held at any angle from building.

Lower end of chute may be held by any two men or may be quickly attached to metal stakes.

Series E EVACUATORS, designed for permanent installation in buildings in order to evacuate occupants quickly and safely in case of fire, are being increasingly used by schools and colleges.

Simply operated:

A **Series P** EVACUATOR is a safety chute of fireproof, mildew-proof duck attached to a metal frame. When not in use, it is folded and stored under a window or within a nearby wall. When needed, it is easily swung into place at the window; a strap is released, and the lower end of the chute falls to the ground, where it can be held either by two adults or by metal posts to which it can be quickly attached. (See photograph at lower left corner of this page.)

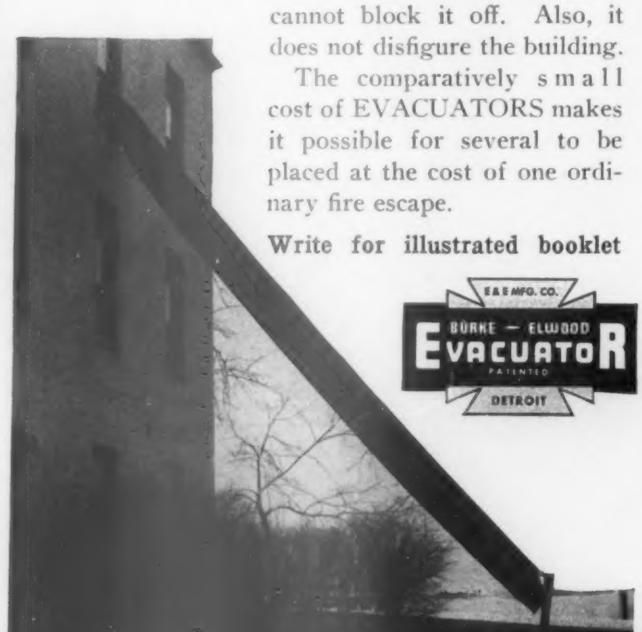
Advantages:

The EVACUATOR has an advantage over certain types of outside open fire escapes, since smoke or flames from lower floors cannot block it off. Also, it does not disfigure the building.

The comparatively small cost of EVACUATORS makes it possible for several to be placed at the cost of one ordinary fire escape.

Write for illustrated booklet

E & E MFG. CO.
BURKE — ELWOOD
EVACUATOR
PATENTED
DETROIT



The chute of the EVACUATOR makes a perfect slide to ground. Descent is just rapid enough to make QUICK, SAFE evacuation. Sides of EVACUATOR are supported by metal-cord ropes in seam.

Norton Door Closers
are manufactured by the

NORTON DOOR CLOSER COMPANY

Division of the Yale & Towne Mfg. Company

2900 North Western Avenue · Chicago, Illinois

EFFICIENCY — ECONOMY

For over 60 years, efficiency and economy have been the watchwords of Norton engineers. Today, Norton Door Closers stand preeminent because they embody features of convenience and durability that result in long-lasting, efficient service at lowest maintenance cost.

The Norton Rack and Pinion principle, with two-speed control, positively holds the door under absolute control through the entire closing movement. It provides a separate adjustment at the latch, slow or fast, for noiseless closing and overcoming the many latch and draft conditions encountered in service. Norton Positive Control assures no surge, slam, or jar, and causes no strain on the door, hinges, or closer.

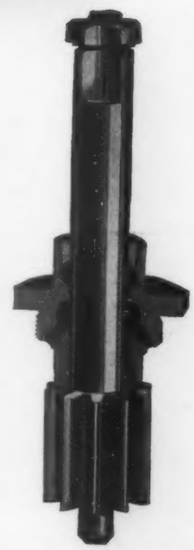
Through standardizing on Norton Door Closers for new construction and replacements, school systems have reduced their door closer maintenance as much as two-thirds.

In schools everywhere, entrance doors, fire exit doors, doors to class rooms, laboratories, offices, gymnasiums, and toilet rooms, are effectively controlled by Norton Door Closers.

Norton Door Closers are designed and built to meet practically every installation requirement. You are invited to consult with Norton representatives, who are skilled in door closer application and operation, for the successful solution of special door control problems. Write for the Norton Catalog.

MINERAL OIL LUBRICATION

Mineral oil is the ideal lubricant for working parts, but it is difficult to retain under pressure. Norton uses mineral oil for lubricating and checking with absolutely no leakage. This is accomplished by the Norton shaft and packing gland construction shown at the right. Accurate machining holds the maximum clearance between shaft and bearing to .00125 of an inch—just sufficient to allow oil to pass for lubrication. This oil is collected in globules in the reservoir above the bearing and returned to the piston chamber through drip holes—it cannot climb above the reservoir because capillary attraction is broken at this point.



THE OVERWHELMING PREFERENCE FOR NORTON DOOR CLOSERS IS BORN OF MERIT

THE HALSEY W. TAYLOR CO.

Manufacturers of Drinking Fountains and Coolers

Warren, Ohio

AGENTS IN PRINCIPAL CITIES

PRODUCTS

Halsey Taylor Drinking Fountains; Combination Cooler Drinking Fountains in Iced Water or Electric Types.

DISTINCTIVE FEATURES THAT APPEAL TO ARCHITECT AND SCHOOL AUTHORITIES ALIKE

It was during the first World War that Halsey Taylor Drinking Fountains were introduced. Today, they are still accepted among the country's foremost fountains, because of their modern design, their distinctive patented features that spell convenience and sanitation alike, and their wide variety of models from which to choose. That is why they are still a preferred specification of architects and builders, whether for schools or other public buildings; industrial plants, hospitals or churches.

You buy more than a mere fountain when you buy Halsey Taylor Drinking Fountains. You buy definite assurance of trouble-free service, positive health-safety, maximum convenience, built-in patented features exclusive with Halsey Taylor!

It is in school operation that a fountain finds its greatest use as a factor in hygiene. When pupils drink from Halsey Taylor Fountains day after day, it is this assurance of health-safety that more than pays for the care in selecting the right make of fountain—and that make usually is Halsey Taylor, practically a standard in school installations the country over. Their most valued features are:

1 — Practical Automatic Stream Control

An automatic device maintains constant height in drinking stream regardless of line pressure variation. Stream never too high, never too low.

2 — Ideal Drinking Mound

The two-stream projector with latest type guard makes the side stream both practical and health-safe, removing objections found with ordinary side-streams.

3 — Definite Sanitation

Drinking mound is formed by the converging of two streams of water, setting up a localized drinking mound which makes it impractical to drink from any other point but the ideal height of the mound. Fingers or lips cannot come in contact with or contaminate water source. It is impossible to squirt the water.

No. 3914

Pedestal Type—No. 3916 **No. 3901**

One of many attractive pedestal and wall types

Battery Types

Many two- and three-part battery types especially adapted to school installations

No. 3912

No. 2703

FOUNTAINS FOR EVERY REQUIREMENT

These pages show a few of the various types of Halsey Taylor Drinking Fountains. There are many models from which to select, all most modern in styling, all with the fundamental Taylor features. Send for catalog.

GENERAL ELECTRIC COMPANY

General Office: Schenectady, New York

SALES OFFICES IN PRINCIPAL CITIES

GENERAL ELECTRIC AUTOMATIC LIGHT CONTROL

Assures Correct Schoolroom Lighting at All Times

An Automatic Thermostat Controls Your Heat — NOW You Can Have Automatic Control for Your Light

In devising an inexpensive photoelectric lighting control unit for classrooms and study halls, the General Electric engineers have succeeded in solving a very vital school problem — the problem of minimizing eyestrain due to faulty lighting.

The application of the photoelectric relay to schoolroom light control is simple. A phototube, or "electric eye," is set up so that natural light from the windows falls on the tube. Variation in the amount of light striking the tube changes the current flowing in the tube. Amplified by a standard radio tube, this change operates a relay which, in turn, operates the lights.

Students' eyes protected by G-E automatic light control in typical school room

Adjustment of the control unit is both simple and permanent. Two knobs located on the control panel in the room fix the light level at which the unit will turn on the artificial light and the level at which the artificial light will be turned off.

Two Types

Two types of G-E automatic light control are available—**flush**-mounted, and **surface**-mounted.

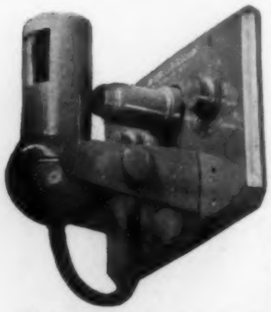
The **flush**-mounted model is best suited for installations in new buildings because it is to be installed on a three-gang outlet box mounted in the wall.

The **surface**-mounted model can be used to advantage where it is not desirable to cut into the room walls.

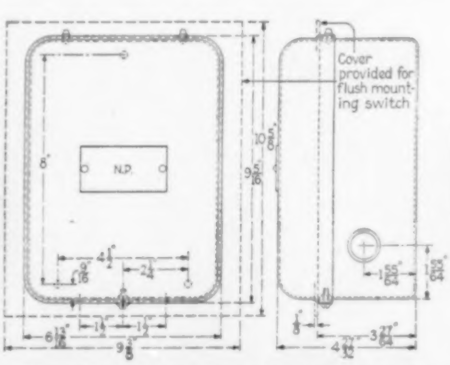
Connections to the lighting circuit of the building may be made at the regular wall switch.

Booklet

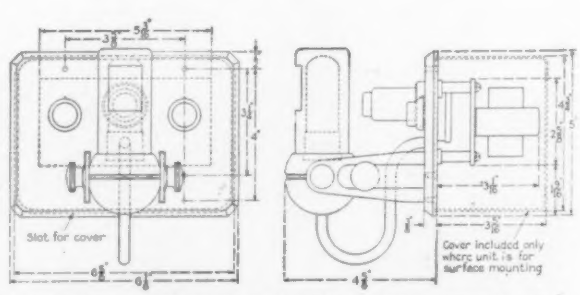
To those school executives or school architects interested in the details of G-E automatic light control, we shall be glad to send a copy of our Booklet No. GEA-2606. Or a G-E representative will be glad to discuss classroom requirements with you, advising the proper type to meet your needs.



Wall-mounted room unit with light-sensitive phototube



Dimensions of remote relay and magnetic switch CR7500-P2A, for operating lights, flush- or surface-mounted



Dimensions of CR7505-D6A light-sensitive control panel, flush- or surface-mounted

HOLOPHANE COMPANY, INC.

342 Madison Ave.
New York, N. Y.

HOLOPHANE PLANNED LIGHTING *For Every School Need*

Combination Auditorium and Gymnasium Lighting with Holophane In-bilt Controlenses

Music Room Lighted with Controlenses

Classroom Lighted with Controlenses

Manual Training Classroom Lighted with Holophane Lobay Industrial Reflectors

Auditorium Lighted with Holophane In-bilt Controlenses

For every area in the school there is a Holophane unit **specifically** designed to provide the most adaptable illumination for the purpose. Planned lighting with Holophane **Specifics** is effective, efficient and economical. For a given investment in current and lamps, each Holophane Specific can be depended on to produce the greatest amount of **useful** lighting.

Operating and maintenance costs are low because there is absolutely no permanent depreciation of the prismatic glass light controlling surface. Temporary depreciation is kept at a minimum because the glassware is easily cleaned. Mechanical design and fixture parts are of excellent construction and material.

School authorities are invited to investigate the **Efficiency, Permanence** and **Economy** of Holophane Planned Lighting. The Holophane Company has maintained an engineering department for nearly half a century as a service to school authorities and their technical advisers. This service is available to you without cost or obligation.

Holophane
COMPANY, INC.
Lighting Authorities—Since 1898
342 MADISON AVE.
NEW YORK CITY
THE HOLOPHANE CO. LTD.
385 Yonge St., Toronto, Canada

What about FLUORESCENT LIGHTING in schools?

You've probably heard something about fluorescent lighting, because it is new, different and effective. Thousands of stores, offices and factories have taken it up . . . because fluorescent lighting provides much more light . . . cooler light . . . with low brightness . . . to help eyes see better, faster, with less strain.

Result: Many a school official is thinking about fluorescent lighting, asking questions. Yet since the first cost is relatively high . . . although operating cost is low . . . most schools are thinking in terms of special applications where critical seeing tasks involved call for more light to guard eyesight. To meet general school needs, we suggest:

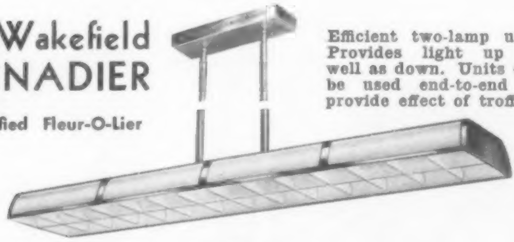
The Wakefield ACE

A Certified Fleur-O-Lier

Gives high intensity downlight with good diffusion. Helpful when you need more light or have ceilings that reflect light poorly. Comes in 4 and 6 lamp units

The Wakefield GRENADIER

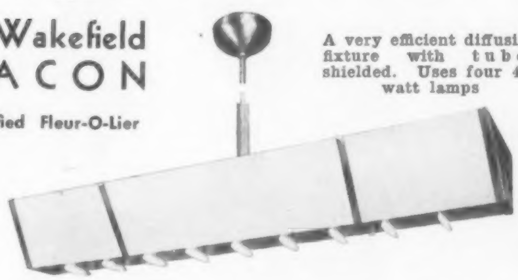
A Certified Fleur-O-Lier



Efficient two-lamp unit. Provides light up as well as down. Units can be used end-to-end to provide effect of troffers

The Wakefield BEACON

A Certified Fleur-O-Lier



A very efficient diffusing fixture with tubes shielded. Uses four 40-watt lamps

WHY THEY GIVE "FLUORESCENT AT ITS BEST"

Wakefield fluorescent lighting fixtures have been engineered to use the new fluorescent lamps efficiently . . . to provide generous, glareless light that helps make seeing easier, guards eyes from strain. In the units above, the tubes are carefully shielded and enough light goes to the ceiling to give smooth, overall, shadowless light. Wakefield fixtures meet over 50 specifications for good light . . . for balanced performance . . . for safety and satisfactory service, by test of impartial Electrical Testing Laboratories. In short, they provide fluorescent lighting at its best.

SEE HOW SOME SCHOOLS USE FLUORESCENT

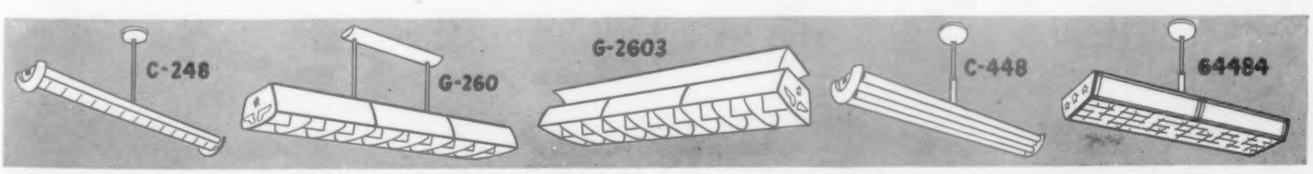
Drafting room, Clearview (Ohio) High School. The Wakefield Beacon helps speed seeing, guard young eyes . . . by providing from 22 to 35 footcandles of light on drafting tables

Sewing room, West High School, Waterloo. The high contrast usually desired between cloth and thread makes good light vital. Here, using existing outlets, Wakefield Fleur-O-Liers increased lighting levels 300% . . . to help protect young eyes from strain and make classwork easier

More even lighting and at least three times the amount of light resulted when Wakefield Fluorescent lighting fixtures replaced the former lighting units in the Library, West High School, Waterloo, Iowa

WRITE FOR FULL DETAILS

Wakefield makes a variety of fluorescent lighting units suitable for other specialized school applications, as the sketches below indicate. Write for bulletin giving complete information and tested layouts for classroom lighting. **Delivery note:** Today orders for vital wartime industries come first. Deliveries on fluorescent lighting units for other use are slow. So, if your school has a priority rating, be sure to supply it on your orders. On priority orders we can often give quick service.



WESTINGHOUSE ELECTRIC & MFG. CO.

FAN SECTION MERCHANDISING DIVISION Springfield, Mass.

"LIVELY AIR"

FOR COOL COMFORT • FOR CLEAR THINKING

Stagnant, dry air forms a "blanket" about the body, causes discomfort, brings on fatigue. Air in motion—LIVELY AIR—breaks up this "dead air blanket". It's cooling, refreshing, invigorating, healthful.

Summer or winter, Westinghouse Long-Life Fans will provide adequate air circulation to keep students comfortable, mentally alert and refreshed. Call your Westinghouse fan representative for specific recommendations on sizes and models, and their proper installation. Let him show you why the Westinghouse line of Long-Life Fans is outstanding in beauty, quietness and cooling efficiency.

FOR OFFICES, DORMITORY LOUNGES

Power-Aire

Pedestal Fans

Distinctive air-flow styling, rich gun-metal gray finish, and ultra-quiet Micarta blades make these portable fans most suitable where beauty and quiet are desired.

Fully enclosed dripproof oscillating mechanism. Height of column adjustable anywhere between 46 and 66 inches. 3 speeds. 12 and 16-inch sizes.

FOR AUDITORIUMS, LARGE DINING HALLS

Whirl-Aire

Air Circulators

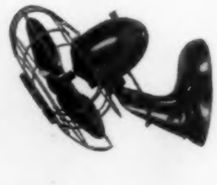
The only long-range air circulators with deep-pitched, ultra-quiet Micarta blades. Individual blades selected for equal weight, and complete blade assembly put in perfect balance—for quiet, economical operation.

Oscillating or non-oscillating models. Roller bases available to make fans easily portable.

FOR CLASSROOMS, LIBRARIES, LABORATORIES

Power-Aire

Wall-Mounted Fans



The aristocrat of desk-bracket fans. Air-flow styling, rich gun-metal gray finish, ultra-quiet Micarta blades. Fully enclosed dripproof oscillating mechanism. 3 speeds. 12 and 16-inch sizes.

FOR DORMITORY ROOMS, REST ROOMS, KITCHENS

Pacemaker

Wall-Mounted Fans

Economical general-purpose fans with quiet Micarta blades. Fully enclosed dripproof oscillating mechanism. Attractive mahogany brown lacquer finish. 2 speeds. 12 and 16-inch sizes.

Westinghouse *Long-Life* Fans

FOR COMPLETE INFORMATION, PHONE YOUR WESTINGHOUSE DISTRIBUTOR

GRAYBAR ELECTRIC COMPANY

Executive Offices: Graybar Building, Lexington Ave. and 43rd Street
New York, N. Y.

DISTRIBUTING HOUSES

Akron, Ohio
Albany, N. Y.
Allentown, Pa.
Asheville, N. C.
Atlanta, Ga.
Baltimore, Md.
Beaumont, Texas
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbia, S. C.
Columbus, Ohio
Corpus Christi, Texas
Dallas, Texas
Davenport, Iowa
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
Duluth, Minn.
Durham, N. C.
Flint, Mich.
Ft. Worth, Texas
Fresno, Calif.
Grand Rapids, Mich.
Hammond, Ind.
Harrisburg, Pa.
Hartford, Conn.
Houston, Texas
Indianapolis, Ind.
Jacksonville, Fla.
Kansas City, Mo.
Knoxville, Tenn.
Lansing, Mich.
Los Angeles, Calif.
Louisville, Ky.
Memphis, Tenn.
Miami, Fla.
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Newark, N. J.
Norfolk, Va.
Oakland, Calif.
Oklahoma City, Okla.
Omaha, Nebr.
Orlando, Fla.
Peoria, Ill.
Philadelphia, Pa.
Phoenix, Ariz.
Pittsburgh, Pa.
Portland, Me.
Portland, Ore.
Providence, R. I.
Reading, Pa.
Richmond, Va.
Roanoke, Va.
Rochester, N. Y.
Sacramento, Calif.
St. Louis, Mo.
St. Paul, Minn.
Salt Lake City, Utah
San Antonio, Texas
San Diego, Calif.
San Francisco, Calif.
Savannah, Ga.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Tacoma, Wash.
Tampa, Fla.
Toledo, Ohio
Washington, D. C.
Wichita, Kan.
Winston-Salem, N. C.
Worcester, Mass.
Youngstown, Ohio

SPECIALIZED ELECTRICAL-SUPPLY SERVICE

The Graybar Electric Company is a nationwide supply source for "everything electrical." It offers products from more than 200 of the nation's leading manufacturers. Prompt service of an individual type, closely attuned to local needs, is made possible by a network of more than 80 local distributing points and offices.

Because its experience is national in scope and extends back for 73 years to the very beginnings of the electrical industry, Graybar can provide an unusual type of service to buyers of electrical equipment in specialized fields . . . such as schools and colleges. Experienced representatives and field specialists know the kind of products that other schools in other communities have found most satisfactory. They know the special conditions that must be met in equipping or wiring school buildings.

When you put your needs for electrical equipment and supplies up to Graybar, you get the advantage of having a single, responsible source for equipment that "goes together" in use.

COMMUNICATION, SIGNALING

Graybar Inter-Phones meet every requirement for modern interior telephone communication. On one popular model, connection to the called party is made simply by pushing a button in the base. Transmission is clear and dependable, and installation and maintenance costs are moderate. Graybar specialists will plan an installation to fit your needs.

Webster Teletalk Systems, also available through Graybar, provide the modern "amplified" type of installed intercommunication. A wide range of units furnish individual communication, or "group" transmission, as required, for 2 to 24 stations or more.

Other Graybar specialties include Edwards "Lokator" paging systems, Edwards and Schwarze Fire Alarm Systems. A full line of accessories, including bells, buzzers, wiring devices, for all types of signaling and alarm requirements are also supplied.

LIGHTING AND LAMPS

Graybar is one of the nation's first-rank suppliers in the field of commercial and institutional lighting.

From the Graybar Lighting Specialist, architects and school boards obtain broad-gaged information on a wide range of fixtures for lighting new buildings or for modernization.

For sight-saving indirect lighting, the smart-looking and highly efficient line of Silvray Luminaires, designed to use silvered bowl lamps, find unusually wide application in school classrooms and other locations where good seeing is essential. Economical new fluorescent lighting is also available "via Graybar." Graybar Lighting Specialists are prepared to lay-out all types of outdoor lighting installations for athletic fields, etc.

When you order lamps from Graybar, you get General Electric Mazdas in the type you require.

WIRE, WIRING SUPPLIES

A full line of supplies for initial installation or for modernization and maintenance is a primary part of the Graybar line. This includes wire, conduit, conduit fittings, switches, receptacles and other wiring devices, extension cords and cable, fuses, tape, altogether some 60,000 items, "everything electrical." If you are looking for electrical equipment of any kind with special features desirable in school-building installations, check with your local Graybar office or write direct to Graybar Electric Company, Graybar Building, New York, N. Y.

THE HOLTZER-CABOT ELECTRIC COMPANY

125 Amory Street **PIONEERS IN SCHOOL SIGNALING SYSTEMS** Boston, Mass.

SCHOOL SIGNALING SYSTEMS

MANUAL FIRE ALARM SYSTEMS

The Last Word in Dependability

Holtzer-Cabot manufactures two types of fire alarm systems widely used in schools today.

The Individual Code Signal system comprises coded units at each fire alarm station and may be arranged to immediately signal the location of the alarm by the code signal of the station operated.

The Master Code system, regardless of the station operated, will sound one distinguishing code signal transmitted from a central coding unit. This system meets the need for a low-cost system adaptable for smaller buildings requiring several fire alarm stations with one code alarm signal. The fire alarm movement associated with the control panel is of the pre-wound master box type, electrically operated from an A.C. or D.C. supply.

In accordance with the best engineering practice, Holtzer-Cabot Fire Alarm systems are under constant electrical supervision, and are so designed that an open circuit on the box circuit sounds a trouble alarm but *not* a fire alarm signal. Operation may be either from an A.C. or D.C. supply.

The Individual Code system may be connected with the municipal fire department, with provision for fire drill alarms without signaling the municipal station.

List No. 151710
UD Vibrating Bell

List No. 163916
"Fire Eye"

List No. 1630821
"ANC" Control Panel

AUTOMATIC FIRE DETECTING SYSTEMS

Detect and Warn of Fire at Its Source

These systems, operated with Holtzer-Cabot Fire Eye Detectors, assure prompt, positive detection of the incipient fire at all hours. The Fire Eye is an automatic fire detecting device operating from an excessive fixed temperature, or sudden heat rise, arranged to sound signal devices through suitable control equipment. Because of its sensitive "Rate of Rise" reaction, it will respond to a temperature increase as little as 15 to 20 degrees per minute. The Fire Eye is ready for service again after cooling.

Three types of systems are available, Automatic Non-Code, Automatic Coded Zone, and Automatic and Manual Coded Zone.

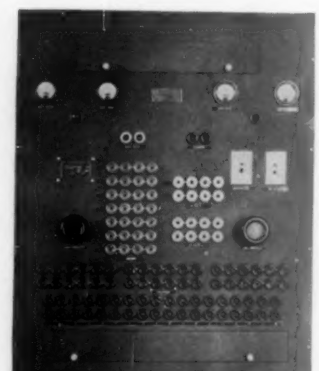
Once the fire is detected by the Fire Eye, a continuous or coded alarm signal is sounded. Where several areas are involved, the coded system should be used, since the code indicates the location of the fire.

The Fire Eye has been approved by Underwriters' Laboratories, Inc.

LABORATORY PANELS

Holtzer-Cabot laboratory panel systems are in general use in many schools and colleges in chemistry and physics laboratories.

The typical system consists of power supply and distribution panels, a storage battery, motor generator set, and special table receptacles for the use of students and the instructor. The purpose of this equipment is to furnish and distribute the various voltages of direct and alternating current from the battery and motor generator to the students' tables and the instructor's bench.

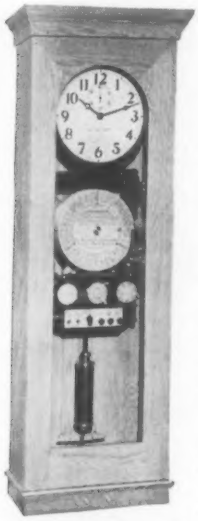


Typical Laboratory Panel

ELECTRIC CLOCK SYSTEMS

The Same Accurate Time All Over the Building

Holtzer-Cabot's electric clock systems, the Pendulum Type Master and Secondary Clocks Systems and the Synchronous Impulse Master and Secondary Clocks Systems are high-grade, dependable, and adaptable to every need.



Master Clock with Automatic Schedule Master Program Machine List No. 170307

Master Clock and Paper Tape Machine List. No. 170303

PENDULUM TYPE MASTER AND SECONDARY CLOCKS SYSTEMS

These systems are made up of a Master Clock operating minute impulse hourly supervised Secondary Clocks. Program signal devices may be incorporated to fit the special requirements of the installation.

All Secondary Clocks are controlled and supervised hourly by the Master Clock, a highly accurate, 60-beat, precision time-keeping device with a range of correction up to 32 minutes slow and 27 minutes fast. This correction feature compensates for minor current interruptions. In the event of more extended interruptions, all clocks can be reconciled collectively with the Master Clock. Secondary Clocks need never be reset individually by hand.

Two program control arrangements are available—the Schedule Master Metal Disc Type and the Paper Tape Type—for sounding program signals on a pre-arranged schedule.

The Schedule Master Type Program Control Machine provides two, four or six different schedules or program circuits, each so arranged that a signal will sound at a pre-selected minute or minutes during an 18-hour period in every 24 hours. The starting time of each period is 6 a.m.

The Paper Tape Type Program Control Machine performs the same functions as the Schedule Master, but with program connections being made through punched holes in the paper tape. The Schedule Master's schedules are set up by inserting pins in holes in the schedule discs.:

Both Program Machines will also ring bells on any desired program at one minute intervals and is furnished in twelve or twenty-four hour schedules, and in two, four, or six program circuits.

Shallow Rim Secondary Clocks are furnished with these systems. They have a convex glass setting over the dial, with Arabic numerals easily readable. Dial sizes are 8", 10", and 12".

Synchronous-Impulse Master Clock List No. 170120

SYNCHRONOUS-IMPULSE MASTER AND SECONDARY CLOCK SYSTEMS

Two different systems, each offering definite advantages of its own, make up the Holtzer-Cabot Synchronous-Impulse Master and Secondary Clocks Systems. Operating power and time-keeping principle are derived from the alternating current supply. Three basic elements make up each system: (a) The Synchronous Master Contactor, (b) the Secondary Clocks, and (c) The Rectifier Power Supply.

The systems are:

1) **TYPE SMIS—Synchro-Impulse Master System.** Controlled by a Synchronous Master Clock operating minute impulse and hourly supervised Secondary Clocks.

2) **TYPE SMP—Synchro-Program Master System.** Controlled by a Synchronous Master Clock with a Paper Tape Program Bell Control Device operating minute impulse and hourly supervised Secondary Clocks.

Round Metal Type Secondary Clocks are available in 8", 10", 12", and 14" dial sizes, designed for flush and semi-flush mounting.

Shallow Rim Secondary Clock—12" Size List No. 170512 FS

SOUND SYSTEMS

Voice, Radio and Phonograph Sound Distribution

Sound Distribution Unit Model 200

The Holtzer-Cabot Model 200 Single Channel Sound Distribution Unit transmits vocal announcements and radio and phonograph programs from a central office to class rooms, auditoriums, and elsewhere.

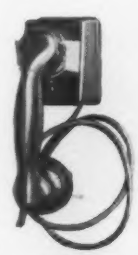
The Model 200 unit can be connected to as many as 40 rooms and auditorium. The cabinet is attractively finished in American Walnut; dimensions are 32" wide x 36" high x 20" deep. Output power is 30 watts.

The radio receiver is equipped with push-button station-selector tuning arranged to automatically increase the band width of the intermediate frequency amplifier, providing high fidelity reception of local stations. The phonograph reproducer, conveniently mounted on the control panel, has a self-starting synchronous motor with an adjustable automatic stop to shut off the motor at the end of the record.

INTER-COMMUNICATING TELEPHONE SYSTEMS

List No. 148960 F

Interior telephone systems, adaptable to all school requirements, are also furnished by Holtzer - Cabot. Selective ringing systems can be supplied to meet all needs.



List No. 148990 F

Many years of satisfactory service are assured because of high standards of engineering and construction.

INTERNATIONAL BUSINESS MACHINES CORPORATION

INTERNATIONAL TIME RECORDING DIVISION

Time Recorders, Electric Time, Program Signaling, Fire Alarm, Telephone, and Industrial Paging Systems

WORLD HEADQUARTERS BUILDING

590 Madison Avenue, New York, N. Y.

BRANCH OFFICES AND SERVICE STATIONS IN THE FOLLOWING CITIES

Akron, Ohio
Albany, N. Y.
Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Bridgeport, Conn.
Buffalo, N. Y.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbia, S. C.
Columbus, Ohio
Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
El Paso, Tex.
Endicott, N. Y.
Erie, Pa.
Evansville, Ind.
Flint, Mich.
Grand Rapids, Mich.
Harrisburg, Pa.
Hartford, Conn.
Houston, Tex.
Huntington, W. Va.
Indianapolis, Ind.
Jackson, Miss.
Jacksonville, Fla.
Kansas City, Mo.
Los Angeles, Calif.
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Newark, N. J.
New Orleans, La.
New York, N. Y.
Oakland, Calif.
Oklahoma City, Okla.
Omaha, Neb.
Oshkosh, Wis.
Peoria, Ill.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Me.
Portland, Ore.
Providence, R. I.
Reading, Pa.
Richmond, Va.
Roanoke, Va.
Rochester, N. Y.
Rockford, Ill.
St. Louis, Mo.
Salt Lake City, Utah
San Antonio, Tex.
San Diego, Calif.
San Francisco, Calif
Scranton, Pa.
Seattle, Wash.
Shreveport, La.
South Bend, Ind.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Tulsa, Okla.
Washington, D. C.
Wheeling, W. Va.
Wichita, Kan.
Winston-Salem, N. C.
Youngstown, Ohio

PRODUCTS

Self-regulating Electric Time Systems, Program Signaling Devices and Systems, Tower and Outside Clocks, Attendance Time Recorders, Job Time Recorders, Time Stamps, Recording Doorlocks, Watchclock Systems, Athletic Event Timers, Fire Alarm, Interior Telephone, and Central Control Sound Distribution Systems.

TIME RECORDERS, ELECTRIC TIME, AND PROGRAM SIGNALING SYSTEMS

International provides a wide variety of timing equipment suitable for the time-indicating, -signaling, and -recording needs of every type of institution, business and industrial organization. Most of the various devices operate either independently or as auxiliary units in the Self-regulating Electric Time System—a system which automatically maintains uniformly accurate time service throughout a building or group of buildings. The International Master Time Control supplies correct time for an unlimited number of auxiliary timing devices and supervises their performance. Once each hour every unit in the system is compelled to compare itself with system time and to make any necessary corrections.

A Typical Tower Clock Built Specially to Conform with Architectural Plan

Secondary or Wall Clock

Printime Stamp

Marble Dial Secondary Clock

Master Time Control with Mercurial Pendulum

All-electric Direct Read Attendance Time Recorder

Job and Attendance Time Recorder

Metal Disc Program Signal Control

FIRE ALARM SYSTEMS

International Fire Alarm Systems are specifically designed to provide the most dependable type of life and property protection. They are furnished in many different types to meet the varied local and State fire regulations, but all conform to a single standard that insures positive operation.

Outstanding characteristics of International Systems are: simplicity in initiating alarms; certainty that the act of pulling a lever or breaking the glass of an alarm station will set the signals into operation; and certainty that the alarms will be heard distinctly throughout the protected area.

Data sheets available in all International Offices.

Break Glass Station

Typical Fire Alarm Control Panel

All International equipment, including Fire Alarm Systems, carries the approval label of the National Board of Fire Underwriters.

Fire Alarm Gong

INDUSTRIAL PAGING SYSTEMS

These systems provide a rapid, convenient, and sure way to locate individuals within a plant or commercial organization, or to reach all members of the personnel simultaneously, with important information or emergency instructions.

The equipment consists of a centrally located transmitter and a sufficient number of sound reproducers to insure complete coverage of a working area. The transmitter is usually placed at or near the private telephone switchboard and controlled by the telephone operator. The sound reproducers are of several types, scientifically designed to operate with maximum efficiency according to the location. In addition to several types for indoor use, there are weatherproof reproducers for outdoor installation.

Operation of the International Paging System is exceedingly simple—any announcement or request for the location of an individual in the plant is made by the telephone operator who presses a key and repeats the request into the transmitter. The message will be heard throughout the entire plant or only in a selected area, depending on the key or keys pressed.

This system serves also for the rapid dispatch of emergency instructions to maintenance men, distribution of chime or other mechanical sound dismissal signals, and "broadcasting" of either phonograph or radio programs.

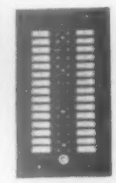
Thousands of schools, colleges, and other institutions are enjoying the advantages of IBM Sound Equipment.

ENGINEERING AND SPECIFICATION-WRITING SERVICE

IBM Branch offices are staffed and equipped to render expert engineering and specification-writing service for the various types of low tension equipment listed above. This service is immediately available. Data Sheets on request.

INTERIOR TELEPHONE SYSTEMS

Cradle Type Telephone



Telephone Keyboard

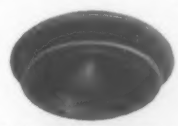
Surface Wall Telephone

ELECTRICAL LABORATORY EXPERIMENTAL PANELS

International Laboratory Panels are built to meet the requirements of the scientific laboratories of modern schools and colleges.

International Telephone Equipment applies strictly and exclusively to intra-communication as a means of purely local administration, management or convenience, and in no way conflicts with public telephone service. It is an automatic administrative aid that permits rapid and efficient transmission of information between individuals and departments.

International Telephone Instruments are of high quality, designed in a variety of convenient styles. Almost any kind or size system is available from a simple two-station line to a standard size switchboard exchange serving hundreds of phones.

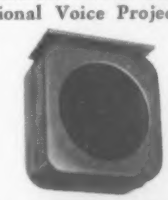


Medium Power Sound Circulator

Central Transmitting Station for PBX Switchboard

Transmitter mounted on adjustable swivel

Medium Power Directional Voice Projector



Two-way Metal Sound Reproducer

High Power Sound Circulator

Typical Amplifying Unit

Consists of pure Class "A" high-gain amplifier with output of 2400 units of coverage.

THE STANDARD ELECTRIC TIME COMPANY

97 Logan Street, Springfield, Mass.

BRANCH OFFICES IN PRINCIPAL CITIES

Manufacturers of

"Standard" Electric Time, Telephone, Fire Alarm Equipment and Laboratory Test and Distribution Systems

Above: **Master Clock**
Right: **Secondary Clock**

PROGRAM CLOCKS

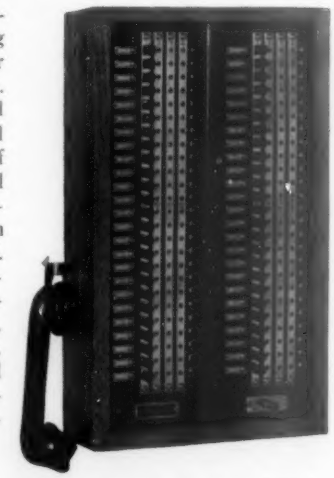
For Schools, Universities and Public and Private Buildings

"Standard" Electric Time Systems are designed and constructed throughout to deliver dependable, precision performance throughout many years of service. Standard Master Clocks are easily and quickly adjusted to meet any program changes that may be required. Program clocks are furnished in either tape or metal disc types. All master clocks are self-winding and designed to control as many secondary clocks as are required for the building. Standard automatic hourly correction control assures accurate time in every room, thereby preventing confusion and delays.

Secondary clocks are available in a wide variety of designs to harmonize with architectural or decorative schemes.

TELEPHONE SYSTEMS

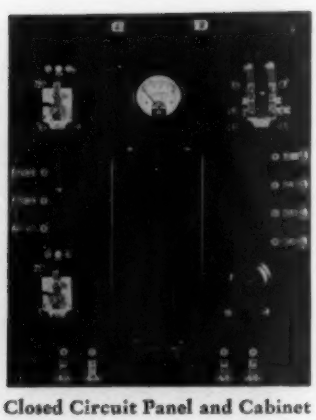
Standard Telephone equipment provides time-saving inter-communication for modern school practices. Consists of combination bell control board and central telephone station. Raising of receiver signals office. All calls go through central station, permitting supervision of conversations if desired. May be installed in combination with program bells utilizing same signals and bells. Wall and hand phone models. Entire system is efficient and simple in construction, requiring practically no servicing or attention.



Above: **Standard Central Telephone Station with hand microphone set**

Left: **Standard Hand Microphone Table Set**

FIRE ALARM SYSTEMS



Closed Circuit Panel and Cabinet

"Standard" Fire Alarm equipment is designed to render unfailing service in emergencies. Materials and workmanship, both of the equipment itself and of the installation, comply with the most exacting requirements and are approved by the National Board of Fire Underwriters. It is available in supervised closed circuit or open circuit types, also with coded stations.

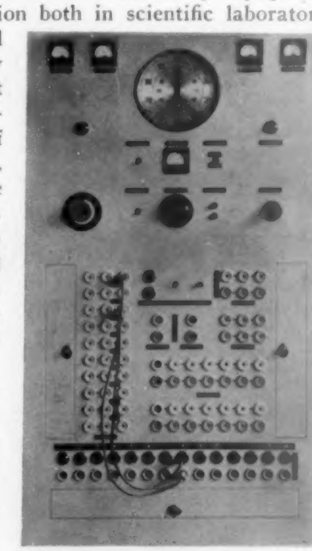
Test can be made readily by opening any station with key. Various types of bell and horn signals, depending on specific needs, are available. Systems may be furnished when so required to be automatically tested each day from program clocks before the daily school session.

LABORATORY TEST AND DISTRIBUTION SYSTEMS

"Standard" Laboratory Panels and accessory equipment perform an important function both in scientific laboratory instruction and in vocational training in electricity. They provide a flexible, convenient method for distributing various voltages and types of current to tables and benches. Connection changes can be rapidly made. Exclusive features include jack construction, perfect contact, colored for ready selection in various voltages, sectional battery charging, and convenient table receptacles.

Standard laboratory equipment increases students' interest in laboratory and shop work, as well as facilitating the instructor's program.

There are many types of Standard Panels for practically all branches of electrical study.



Typical Laboratory Experimental Panel

THE ELECTRIC STORAGE BATTERY COMPANY

World's Largest Manufacturers of Storage Batteries for Every Purpose

Allegheny Avenue and Nineteenth Street, Philadelphia, Pa.

Atlanta, Ga., 210 Walker St., S. W.
Boston, Mass., 100 Ashford St.
Chicago, Ill., 4613 So. Western Blvd.
Cincinnati, Ohio, 718-19 Temple Bar Bldg.
Cleveland, Ohio, 6400 Hermann Ave., N. W.
Dallas, Texas, 1118 Jackson St.
Denver, Colo., 810 14th St.
Detroit, Mich., 8051 W. Chicago Blvd.
Kansas City, Mo., 129 Belmont Blvd.
Los Angeles, 1043 S. Grand Ave.
Minneapolis, Minn., 617 Washington Ave., N.
New Orleans, 428 Balter Bldg.
New York, N. Y., 23-31 W. 43rd St.
Philadelphia, Allegheny Ave., and 19th St.
Pittsburgh, Pa., Union Trust Bldg.
St. Louis, Mo., 1218 Olive St.
San Francisco, Cal., 6150 Third St.
Seattle, Wash., 1919 Smith Tower Bldg.
Washington, D. C., 1819 L St., N. W.

In Canada, Exide Batteries of Canada, Ltd., 153 Dufferin St., Toronto, Ont.

Protection Against Dangers of Sudden Lighting Failure

IT'S THE FIRST 60 SECONDS THAT COUNT

Exide Keepalite EMERGENCY LIGHTING UNITS

Lighting Failures Do Happen—Storms, fires, street accidents, floods, blown fuses, short circuits—all events which electric companies are helpless to foresee or prevent—do cause electric lighting interruptions.

No Community or Building Immune—Electric service interruptions occur without warning, when least expected and where least wanted. An auditorium or gymnasium crowded with pupils at sports, plays, lectures or dances, is no place to gamble with the risks of injury or damage which frequently follow the sudden darkness of a lighting failure.

Danger Unnecessary—Today, emergency lighting can be provided for the vital parts of any school building by installing Exide Keepalite. During an electric service interruption, Exide Keepalite furnishes the power from a dependable Exide Battery to the lights in auditoriums, gymnasiums, corridors, exits, fire towers, stairways, engine rooms, locker rooms, swimming pools, dormitories, laboratories, etc.

Automatic Protection—Exide Keepalite Emergency Lighting Battery Systems are completely automatic and instantaneous in operation. Electrical engineers agree that a storage battery, properly maintained, constitutes the most dependable source of emergency power. Automatic control equipment is provided for recharging the battery after an emergency discharge; and, low rate charging equipment provides the current needed to keep the battery fully charged at all times. The only maintenance required by Exide Keepalite Systems is the addition of a little water to battery cells three or four times a year. Exide Keepalite Systems assure this form of protection at a maintenance cost as low as 1½¢ a day for power.

Exide Batteries have been used in emergency service, by telephone, railroad and public utility companies since 1895. The new Exide Keepalite control equipment, which automatically keeps the battery properly maintained, represents the qualifications found desirable from the experience of more than 2000 installations in all kinds of buildings, including a large number of schools.

A Typical Exide Keepalite System with a 60-cell Exide Battery and a 3450 watt Control Unit. It Operates Instantly and Automatically. The Infrequent Addition of Water to the Battery Is the Only Maintenance Required

For Any Size Installation—In order to economically meet the widely varying requirements of individual school buildings, 115 volt and 12 volt Exide Keepalite Systems are available. The important electrical circuits of entire buildings can be protected with the larger 115 volt systems; or, parts of buildings can be adequately safeguarded with the specially designed low voltage Exide Keepalite Systems. Depending upon the amount of protection desired, Exide Keepalite Systems can be had for $150 and up.

Superiority of Storage Battery Emergency Lighting Systems—Exide Batteries have long been used in not only emergency lighting service but also emergency power service. They give instantaneous and reliable protection.

Battery Life—Exide Batteries have long been noted for their exceptionally long life. In many industrial emergency power installations Exides have faithfully served more than 10 years.

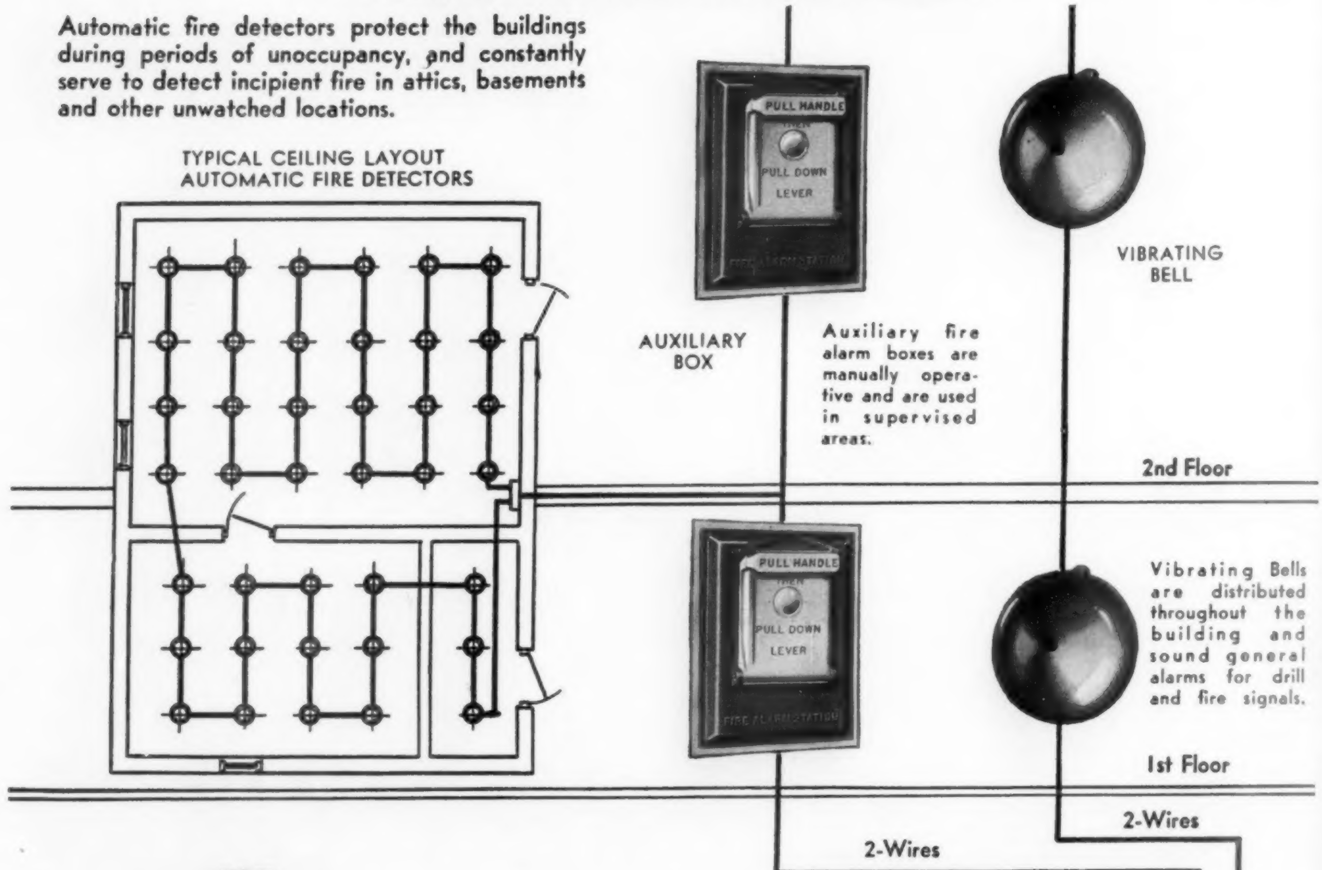
THE ELECTRIC STORAGE BATTERY COMPANY offers the services of its trained Engineering Department to assist architects in the planning of a trouble-free Emergency Lighting System. We will be glad to send you complete descriptive literature and specifications for every type of Exide Keepalite Emergency Lighting Battery System.

This $150 Exide Keepalite (Battery in Unit) Protects Lighting of Areas Up to 10,000 Sq. Ft. It Operates Instantly and Automatically

DEPENDABLE EXIDE LABORATORY BATTERIES AVAILABLE IN ANY SIZE, **SEE PAGE 404**

A TYPICAL DUALARM SYSTEM

Automatic fire detectors protect the buildings during periods of unoccupancy, and constantly serve to detect incipient fire in attics, basements and other unwatched locations.



Exit Alarm Systems are identical with the above except that the Master box connection with the Fire Department is not supplied.

Spacing (1) Automatic fire detectors—generally the distance between centers should not exceed 15 feet with the first line 7½ feet from the wall. (2) Auxiliary Fire Alarm Boxes—at least one on each floor located at or near exits. (3) Vibrating Bells—sufficient in number and properly distributed to be heard distinctly in all parts of the building.

Specifications

THE GAMEWELL DUALARM SYSTEM

Detailed Specifications (Typical)

NON-CODING TYPE—This system shall include devices and circuits providing for the manual and automatic initiation of alarms of fire and for the manual initiation of fire drill signals. The act of initiating an alarm of fire whether manually or automatically performed, shall result in the transmission of a distinctive code signal to the fire department and the operation of local alarm equipment within the premises. The local alarm shall sound continuously until manually disconnected and shall be of the so-called non-coding type. The system may be arranged to sound an intermittent code indicating fire, if so desired, such as 4-4 repeated continuously irrespective of point of origin within the premises.

CODING TYPE—The coding type Dualarm system is identical in function with the non-coding type except that the manually operated auxiliary fire alarm boxes within the premises shall act to cause a distinctive code signal indicating the location of the box operated to be sounded on the local alarm equipment throughout the premises.

EQUIPMENT, NON-CODING TYPE—1 Master type fire alarm box with supervisory alarm panel; 1 Dualarm control and fire drill panel; Auxiliary fire alarm boxes for manual operation; Automatic fire detecting devices—Sprink-la-stats; 8" Vibrating bells, 110 volt A.C., for sounding local fire alarm or drill signals.

All of this equipment shall be located as described or shown on the plans and approved by the (owner, architect, engineer, or other official).

MASTER FIRE ALARM BOX—The master box shall be of the Gamewell Three-Fold successive type, designed for inclusion in the municipal fire alarm circuit of the City of .... and to be automatically actuated by the operation of any auxiliary fire alarm box or automatic fire detecting device connected therewith. The successive feature shall provide for the proper transmission of an alarm to the fire department even though, at the time of operation, the municipal circuit may be engaged in transmitting an alarm from another box. In such an event, the local fire alarm shall be instantly sounded and the alarm to the fire department transmitted as soon as the municipal circuit is free to receive the signal. The master box shall be so arranged that, after it has been actuated from a remote control station, it will automatically disconnect the local fire alarm circuit to prevent needless repetitions of the alarm to the fire department. The master box shall be arranged so that it may be manually operated at any time to call the fire department without causing an operation of the local alarm equipment.

SUPERVISORY PANEL—There shall be associated with the master box, a supervisory alarm panel (located wherever specified) for audibly and visibly indicating an operation of the master box to transmit an alarm. The equipment mounted on this panel shall consist of a 4" Underdome type, 110 volt, A.C. vibrating bell, pilot lamp, and bell-silencing switch. It shall be possible to silence the bell at any time by means of the switch but the visual indication shall continue until the master box is re-set and the local fire alarm circuit restored to its normally operative condition. The panel shall consist of a 6" x 9" grained erado face plate mounted on a—flush or surface—type wall box. (See illustration.)

DUALARM CONTROL AND FIRE DRILL CABINET—

1. The cabinet containing the control equipment shall be of sheet steel 16" wide, 18" high, and 6" deep, finished with black crystal lacquer. (Specify whether surface or flush mounting is desired.) The cabinet shall be provided with a hinged door with brass cylinder lock and knob catch. The operating equipment shall be mounted on an ebony asbestos panel, ½" thick, finished with dull black lacquer.

2. There shall be mounted on the panel, all necessary equipment and wiring to control the Dualarm System in conjunction with the master box and the alternating current supply for the local alarm circuit. This equipment shall include a supervisory relay connected in the A.C. circuit. The local auxiliary fire alarm circuit shall, in addition to providing a path for the direct fire alarm current, also provide a route for the supervisory alternating current which holds up the relay and thus establish double supervision. Any interruption of the auxiliary fire alarm circuit shall actuate the master box, disconnect the alternating current supply to the relay and energize the pick-up coil of a bell-ringing contactor. The contactor shall be rated at 10 amperes, intermittent operation.

3. The wiring plan shall be such that the local alarm equipment will be responsive only to an interruption of the auxiliary fire alarm circuit and in the event of such interruption, the local alarm shall continue until the auxiliary circuit has been restored to normal condition. The system shall be so arranged that should an actual fire occur while a drill signal is being sounded, the alarm may be transmitted to the fire department as a result of the operation of an auxiliary fire alarm box, an automatic fire detecting device, or of the master box itself.

4. (Drill Feature.) There shall also be mounted on the panel suitable push buttons whereby drill signals may be initiated and terminated without causing an operation of the master box.

AUXILIARY FIRE ALARM BOXES—NON-CODED—These boxes shall each consist of a steel outlet case having mounted thereon a cast aluminum face plate. The operating mechanism shall be secured to the back of the face plate with the operating lever extending through an opening in the plate. A spring-retained pull-down door is mounted over the operating lever, a simple movement of which shall expose the lever, ready for operation. The general design and method of operation are identical to a municipal fire alarm box and proper instructions for operating shall be cast on the face plate.

Each operating mechanism shall include a metal encased mercury contact tube rated at 110 volts, 2 amperes, secured in an insulating holder of molded bakelite. The operation of the pull lever shall serve to open the auxiliary control circuit and actuate the master box. The auxiliary boxes shall be connected in series in the control circuit. When operated, the handle shall be locked in the operated position to ensure continued actuation of the contact tube and may be restored to normal position by means of a release key which shall be supplied with the system.

The face plate including the pull-down door shall be of high strength aluminum alloy and a cast aluminum trim plate shall be provided to adapt the face plate to the outlet box to compensate for any irregularity in position, and in flush type installations, to cover the plaster line. No fastening screws shall be visible from the front of the box.

NOTE (1): *In cases where local indication on an annunciator of the auxiliary box operated is desired, add the following paragraph:*

Each box shall be provided with a local open-circuit annunciator operating contact which shall consist of a mercury tube similar to that described for the closed auxiliary circuit. In this case a movement of the operating handle shall serve to open the auxiliary control circuit and close the local annunciator circuit, thus indicating on the annunciator the exact location of the auxiliary box operated.

NOTE (2): *The auxiliary fire alarm boxes described are designed for operation in either the shunt loop circuit requiring no local battery or other local source of energy, or in a local auxiliary circuit energized by local battery.*

AUTOMATIC FIRE DETECTORS—The automatic fire detectors shall be of the fixed temperature type SF-4R for exposed conduit—or SF-4 for flush mounting. The detectors shall be set to a temperature rating of 135° F. and the operating point on all detectors shall be within a maximum variation of ± 5° F. The stability shall be such that continued exposure at 125° F. shall not cause a detector to operate. The sensitivity shall be such that on the basis of measurements used by the Underwriters Laboratories, Inc., a minimum spacing of 15 feet from center to center will be approved. The detectors shall be capable of being tested for operation in their positions after installation and repeated tests shall not in any way affect their characteristics.

All detectors shall have their contacts and operating mech-

anisms enclosed in a hermetically sealed glass tube, protected by a guard of stamped sheet brass. The contact surfaces shall be made of platinum or of platinum-iridium alloy containing not less than 90% platinum, and 10% iridium. There shall be no exposed wire connections. Suitable binding screws for the attachment of wires without soldering shall be provided on the detector mounting. Each detector shall be completely assembled and tested ready for mounting in a suitable standard cut-out box.

NOTE: *The detectors are available in standing ratings of 135° F., 185° F., and 260° F., but may be supplied in any rating from 0° to 300° F. Stability under continued exposure is guaranteed at 10° F. below the temperature rating employed.*

VIBRATING BELLS—The bells shall be of the Underdome type in which the mechanism is entirely concealed under the bell. The mechanism shall be synchronous in operation, not of the solenoid type and shall have no sliding plunger or contacts likely to wear or stick. The case containing the mechanism shall be mounted to a separate back plate fitting a standard two-gang switch box and be held securely in position by one lock nut. There shall be a heavy duty, two-way plug on the bell and a receptacle on the back of the plate with terminals for connecting the wires. All current-carrying parts shall be thoroughly insulated from the frame and withstand a break-down test of 1800 volts alternating current. The bell proper shall be of pressed steel, 8" in diameter, black nickel finished.

(NOTE: *These bells are available in 4", 6", 8", 10" and 12" sizes.*)

EQUIPMENT—CODING TYPE—The specifications for the Gamewell Dualarm Coding System are identical with those of the non-coding type except as follows:—

Control and Fire Drill Cabinet—Change third paragraph to read: "The equipment and wiring shall be so arranged that the local alarm equipment will be responsive only to an interruption of the auxiliary fire alarm circuit, and, when such interruption is caused by the operation of a coded fire alarm box, the code number of such box indicating its exact location shall be sounded on all of the alarm bells connected with the system. The system shall be so arranged that should an actual fire occur while a drill signal is being sounded the alarm may be transmitted to the fire department as a result of the operation of an interior fire alarm box, an automatic fire detecting device, or of the master box itself."

Eliminate the fourth paragraph of the control cabinet specification and substitute the following specification for the Auxiliary fire alarm boxes:

INTERIOR FIRE ALARM BOXES—CODED (VITA-GUARD TYPE)—These fire alarm boxes shall each consist of code signal formulating mechanism securely enclosed within a sheet steel outlet case attached to a cast aluminum face plate. The operating lever shall extend through the plate and be protected by a standard fire alarm box quick action cover.

The boxes shall be of the sector pull type, normally unwound, and the act of pulling the starting lever of a box shall wind the signal formulating mechanism sufficiently to cause the transmission of four rounds or repetitions of its code number indicating its exact location. The starting lever and co-operating parts of each box shall be so arranged as to prevent any possibility of interference with or mutilation of signals by careless or malicious manipulation. The starting lever shall also be so arranged as to completely disengage itself from the signaling mechanism and not to again engage same until after the box has completed its signal.

The boxes shall be designed to operate on a normal current flow of 100 milli-amperes D.C. and to successfully perform their functions under wide variations of current strength from normal. All metallic parts connected to the circuit shall be thoroughly insulated from all other parts of the signaling mechanisms. The signaling contacts shall be made of selected materials of the best known kinds for the purpose and faced with heavy contact points of pure silver. The code wheels shall be cut on a uniform index, so that each wheel, irrespective of number, will require the same time for each revolution as all other code wheels in the system, and so that box numbers may be readily interchanged without the necessity for retiming the code signaling mechanisms.

The signaling mechanisms shall be manufactured from selected materials of the best quality for the purpose; all steel parts shall be of stainless steel and all iron parts rust-proofed by the Parkerizing process. The entire assembly shall be thoroughly finished and protected in the best known manner from corrosion and tarnish. Suitable terminals for the wires shall be provided and conveniently installed on each mechanism.

The face plate and quick-action cover over the starting lever shall be of high strength cast aluminum alloy and a cast aluminum trim plate shall be provided with each box to adapt the face plate to the outlet box to compensate for any irregularity in position, and in flush type installations to cover the plaster line. No fastening screws shall be visible from the front of the box.

GAMEWELL PROPRIETARY FIRE ALARM SYSTEMS

For institutions and properties of sufficient size to warrant the installation of complete signaling systems, each including a central operating and supervising station at the property to be protected. Such systems are under the exclusive control of the owners and are maintained, operated, and supervised by them. Provision may and should be made for the simultaneous transmission of alarms to the municipal fire department when practicable.

These systems consist of automatically supervised electrical circuits and associated instruments whereby alarms of fire may be initiated, sounded, and recorded.

ESSENTIAL CHARACTERISTICS

1. Alarms—prompt and distinctive—for assembling the local fire fighting organization at the scene of the fire.
2. For the automatic operation of water and foam deluge sets—if any in the affected area.
3. For notifying the municipal fire department if one is available, of the existence and location of fire in the institution.
4. Local—providing for the safety of the occupants and employees in the building or area affected by fire.
5. Automatically closing fire doors in the affected area. NOTE: *All of the foregoing operations result simultaneously from the act—manually or automatically performed—of initiating an alarm of fire.*
6. The continuation of operations in buildings or areas not affected.
7. Automatic sprinkler supervision in sprinklered buildings to the end that alarms will be instantly given for sprinkler operation by fire or accidental waterflow.
8. Drill alarms—whereby periodic drills of the local fire brigade and other employees may be held for instructive purposes. This feature is required by law in some states and the cost is negligible if included in the initial installation of a system.
9. Automatic supervision—the system is of the automatically supervised type and any accidental break in a circuit and consequent interruption of service will be instantly announced and recorded.
10. Ability to transmit alarms even though the circuit may be accidentally broken when the system is operated for fire. This feature is of vital importance as fire may have opened the circuit depended upon to announce the alarm.

SURVEYS, PLANS, AND ESTIMATES SUPPLIED ON REQUEST

THE KINNEAR MANUFACTURING CO.

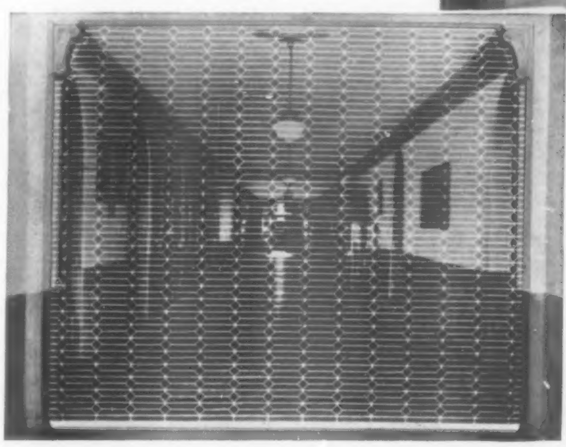
2240–2260 Fields Avenue, Columbus, Ohio

Manufacturers Exclusively of Rolling Doors and Grilles

PRODUCTS—Steel Rolling Service Doors, Automatic Fire Doors and Shutters, Metal Rolling Grilles, Wood Rolling Partitions and Wood or Steel Upward-Acting Doors.

GENERAL—The Kinnear Manufacturing Company pioneered and have devoted their entire effort for the past 44 years to rolling or Upward-Acting type Doors and Grilles. They have established the reputation throughout the world as specialists in doors that save floor and wall space, operate more conveniently, reduce maintenance expense through unusual durability and that can be built for old or new buildings for inside or outside use.

Kinnear Motor Operated Steel Rolling Service Door



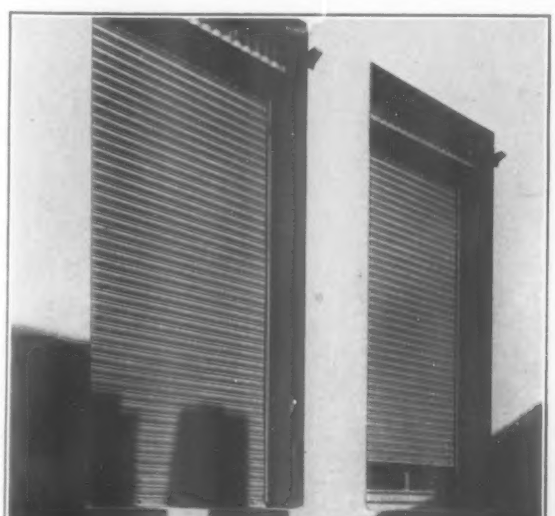
Metal Rolling Grille for Inside or Outside Use

Permanently installed but may be rolled up out of sight. When closed, admits air, light and vision. Also, if desired, may be locked to prevent raising.

STEEL ROLLING DOORS—Kinnear Steel Rolling Doors are composed of a flexible metal curtain which coils above the lintel, similar to a window shade. They can be installed either on the face of the wall or between the jambs when concealment of the mechanism is desired. Springs provide perfect counterbalance. They can also be operated manually, mechanically or electrically. Built of the finest materials and to high manufacturing standards they give years of dependable service.

METAL ROLLING GRILLES—Operating on the same principle as the Steel Rolling Door, the Kinnear Rolling Grille is a permanently installed and attractively designed barrier that is remarkably strong when closed and locked, but out of sight when opened. When down, it admits air and light, and does not obstruct vision, making it particularly applicable to all types of interior and exterior openings as well as hallways in school buildings. Built of various metals, the grille proper is of remarkable strength and artistically designed of steel bars spaced close enough to prevent the admittance of large projectiles or a man's hand. For locking in closed position a lock is furnished. The Kinnear Rolling Grille may be mounted on the face of the wall with brackets and coils entirely above the bottom of the lintel and with edges of guides flush with the face of opening jambs; or where headroom is limited and grille cannot be installed on the face of the wall it may be mounted in the opening.

AUTOMATIC FIRE DOORS AND SHUTTERS—Kinnear Fire Doors, though suitable for service purposes, are "labeled" and equipped with mechanism for automatic closure in case of fire. They are suited for installation in outside or inside door or window openings and in general construction, operation and mounting are similar to Steel Rolling Service Doors. To insure maximum fire protection they are equipped with an auxiliary push-down spring to insure positive closure; a governor for controlling speed of curtain closure; auxiliary hood to protect counterbalance mechanism; and other features in excess of the requirements of the Underwriters' Laboratories. Their superior design has proved its worth in many major conflagrations.



Automatic Fire Shutters for Windows or Doors

BRANCH OFFICES

Boston	Philadelphia	New Orleans	Cleveland	Detroit	San Francisco
New York	Washington	Pittsburgh	Cincinnati	Chicago	Baltimore

AGENTS IN ALL PRINCIPAL CITIES

KINNEAR
ROLLING DOORS

DETROIT STEEL PRODUCTS COMPANY

General Offices: 2274 East Grand Boulevard, Detroit

SALES OFFICES IN 200 CITIES

To bring you the windows you want when you want them, America's oldest and largest manufacturer of solid-section steel windows has 4 factories, 15 warehouses, 200 direct-factory offices. 16 of these offices have complete engineering departments. . . . Look for "Fenestra Steel Window Company" in the alphabetical section of your telephone book—or write direct to the Detroit Office.

Fenestra STEEL WINDOWS FOR SCHOOLS

YOUR schools deserve the best in windows—(1) to assure the health and efficiency of children and teachers—(2) to provide architectural beauty and interior cheerfulness—(3) to afford maximum economy in first cost and upkeep.

You need windows especially developed to do these things—windows perfected through years of research and experience, in collaboration with leading school architects and authorities.

Fenestra offers you such windows—plus the services of a large staff of window experts, whose counsel is at your disposal at any time, without obligation, to help you attain the most attractive, efficient and economical window layouts.

SOME FENESTRA ADVANTAGES

1. Better Daylighting—Fenestra Windows help prevent defective vision. . . . Thanks to slender steel frames and muntins and to the absence of bulky weight boxes and slide mechanisms, they afford greater glass areas than ordinary windows—30% and more. And with them you can carry the glass line to within 1⅜" of the ceiling, to provide the important extra daylighting for desks at the room's far side.

2. Better Airation—You can have 100% window opening with Fenestra Windows—twice as much as with double-hung windows. And you can select windows with sill ventilators that deflect drafts upward, and with upper ventilators that can be opened even when it rains.

3. Easy Operation—Ventilators are designed to open easily, silently. And steel windows don't warp, shrink or swell.

4. Safe Cleaning—All Fenestra Windows are cleaned on both sides from inside the room. You save the cost of special window cleaning equipment and labor. You eliminate window cleaning hazards

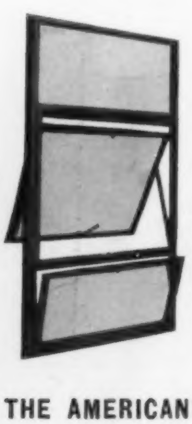
Projected Fenmark Windows in School at Northville, Michigan; Architects, Lyndon and Smith, Detroit

5. Fire Protection—Steel windows cannot burn; they help localize a fire, prevent its spread. And damage to steel windows during a fire is usually slight; restoration costs are low.

6. Lower Cost—Modern production methods now bring you steel windows at a first cost often less than that of ordinary windows. . . . Maintenance cost is cut to a minimum. . . . And you can have Fenestra Windows Bonderized and primed at the factory, for protection against rust.

THESE are but a few of the features that have made Fenestra Windows the choice for thousands of schools throughout the country. For complete information, look for Fenestra in SWEET'S—or write today for Fenestra's catalog of Heavy Casement-Type Steel Windows.

SOME TYPICAL FENESTRA WINDOWS

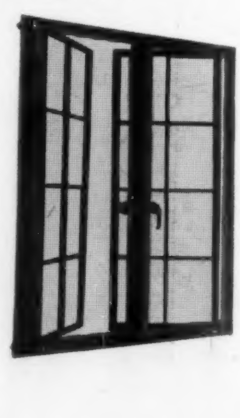


PROJECTED FENMARK

The ideal classroom window. Sill vent opens in, deflects drafts upward. Upper vents open out, form canopy over opening. Easily, economically screened and shaded.

DALMO-FENMARK

For fresh-air schools and wherever 100% ventilation is required. Vents open out; all are operated in unison through mechanism connected to bottom vent. Easily screened.



FENCRAFT CASEMENTS

Particularly adapted to dormitories, clubs and such buildings. Swing-leaves open out, for maximum fresh air. Opened, closed and locked without touching inside screens.

JOHN E. LINGO & SON, INC.

Established 1897

Manufacturers of
Metal Flagpoles

29th Street & Buren Avenue
Camden, New Jersey

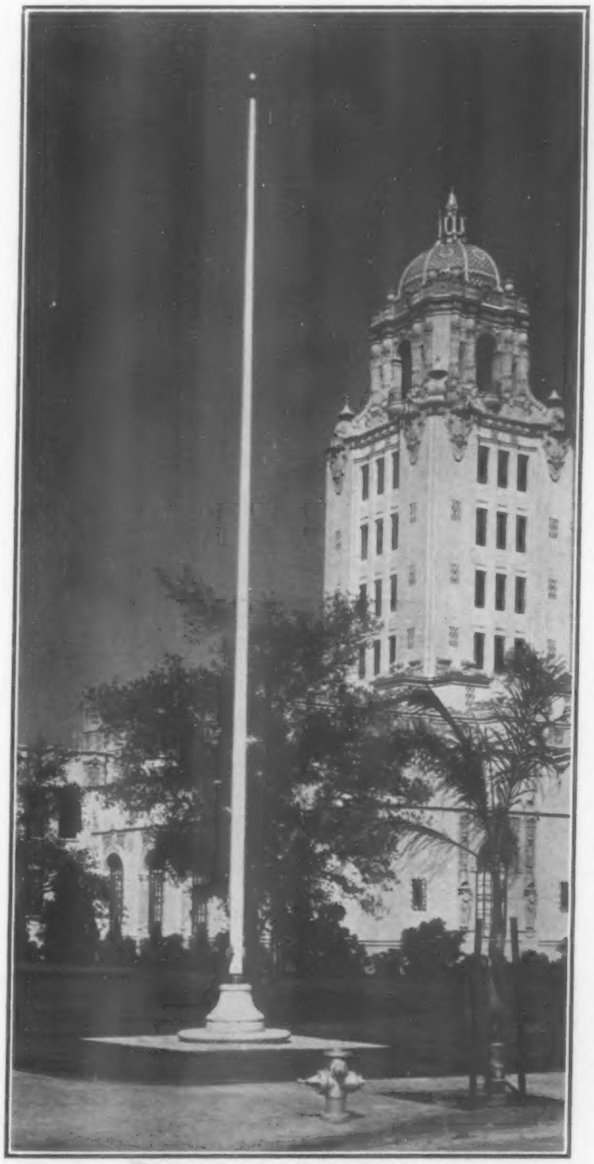
Telephone: Camden 487

TWO DISTINCT TYPES OF STEEL FLAGPOLES

CONTINUOUS STRAIGHT TAPERED FLAGPOLES

Continuous Straight Tapered flagpoles are made of **new** high grade open hearth steel, have a smooth uninterrupted exterior surface throughout without visible joints and offsets, and resemble a wooden flagpole in appearance. They are standardized in lengths from 20 ft. to 200 ft. These poles are carried in stock and prompt shipments can be made.

Continuous Straight Tapered flagpoles are ideal as replacements of wooden flagpoles, for not only is the appearance the same but the steel pole affords lightning protection, unlimited life and dependability, not usually found in wooden flagpoles.



50 Feet Above Grade, Continuous Straight Tapered Heavy Type Steel Flagpole, City Hall, Beverly Hills, Calif.

SWAGED SECTIONAL FLAGPOLES

Swaged Sectional flagpoles are fabricated in sections of **new** full weight copper bearing steel pipe with hydraulic die-swaged, telescoped and shrunk joints, made without the use of bolts, rivets, pins, screw couplings or lead calking. They are standardized in lengths from 15 ft. to 200 ft. These poles are carried in stock and immediate shipment can be made.

CATALOGUES AND SERVICE

60-page general catalogue and descriptive pamphlets giving full information, details, specifications, prices, etc., promptly mailed on application. Our Engineering Department will gladly assist you in planning your flagpole installations most satisfactorily and economically, without obligation on your part whatsoever.

FACILITIES

John E. Lingo & Son, Inc., is noted for its ability to produce metal flagpoles promptly, regardless of height, diameter, or quantity. Our large stock of material, and extensive plant facilities usually enables us to ship flagpoles quicker than any other similar establishment. By pledging our full cooperation to the U. S. Government during the Emergency, our manufacturing facilities are devoted to defense work. Defense orders must be given preference but non-defense orders will be taken care of as quickly as possible.

QUALITY OF PRODUCTS

NEW MATERIAL **EXCLUSIVELY** IS USED IN THE MANUFACTURE OF "LINGO" FLAGPOLES. You are guaranteed that our pipe and tubing is new, full weight and mill tested. Affidavits and mill certificates attesting to the use of new material gladly furnished if desired. We do not use second-hand, untested, mill rejected, rerolled or light weight material. Red lead and other nontransparent primers serve as an ideal medium for hiding inferior materials and construction, so "LINGO" flagpoles are painted a shop coat of nonrust transparent varnish which permits immediate and positive inspection of the material and construction used. Your selection of a "LINGO" flagpole assures a high quality product, designed by pioneer flagpole manufacturers and constructed by competent mechanics.

Inspection of Your Present Flagpoles Now May Save Lives Later!

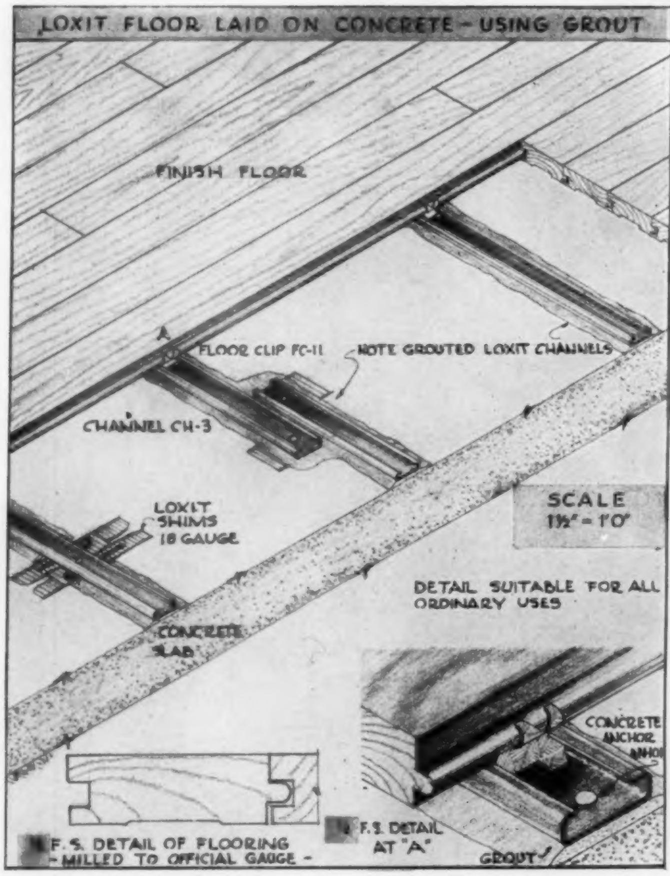
THE LOXIT COMPANY

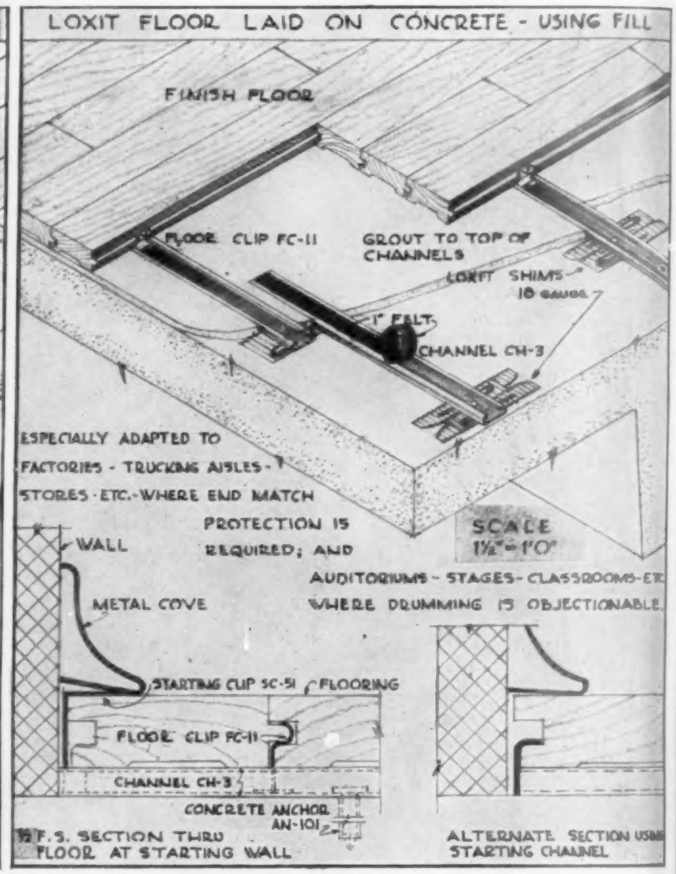
605 W. Washington Blvd., Chicago, Illinois

THE LOXIT FLOOR LAYING SYSTEM

For Standard T&G Wood Floors—Eliminates Nails, Wood Sleepers, Mastic

(Patented)





A PROVEN, ECONOMICAL SYSTEM FOR ALL TYPES OF BUILDINGS—The Loxit system is a simple mechanical method for laying ordinary strip wood flooring without nails, wood sleepers, or adhesives. It consists of:

(a) A metal channel $1\frac{1}{8}$ in. wide by $\frac{5}{16}$ in. high with overlapping top edges, punched 4 in. o. c. for fastening.

(b) Uniquely designed clips to be used in laying and locking the floor boards together and to the channels.

ADVANTAGES OF THE LOXIT SYSTEM—

1. Total overall thickness of a Loxit laid floor including $\frac{13}{16}$ in. flooring is $1\frac{1}{8}$ in.
2. Floor can be laid without expansion joints as the Loxit system limits expansion.
3. Loxit floors can be laid tight, in fact the tighter the better, provided the usual precautions as to building conditions and acclimatization of the flooring have been taken, thereby securing a tight floor to start with.
4. Excessive shrinkage, repairs, and replacements can be easily and economically handled when floors are laid with the Loxit system because they can be taken up and re-laid without waste other than new clips.
5. Squeaks in wood floors are caused by vertical movement. When Loxit channels are properly shimmed and grouted and the floor securely locked into place in accordance with instructions, vertical movement is eliminated and squeaking avoided.
6. Floors may be satisfactorily laid in basements and other areas where other types of wood flooring could not be used by following the simple precautions that are necessary under such conditions.
7. Loxit laid floors require only light sanding.
8. No special milling is required. All flooring milled in accordance with the gauge adopted by the hardwood flooring manufacturers' associations can be used.
9. Loxit being a simple mechanical system of few parts, can be mastered within a few hours by any experienced floor layer. There is only one set of rules to follow and only one way of doing the work properly, the same as any other mechanical assembly. This eliminates guessing, simplifies floor laying, makes supervision easy, and assures uniformly good results.

HOW TO USE THE LOXIT SYSTEM—Loxit channels are spaced 12 in. o. c. and lapped at the ends when floor area is more than 10 feet wide. They are secured to sub-floor using a suitable type of anchor, levelled, shimmed, and grouted. The wood flooring is laid in the same way that a nailed floor would be laid, but instead of using nails to fasten the flooring, a cleverly designed metal clip is used. The carpenter slips these clips into the channels immediately ahead of the last board and drives them into place by driving up the next board. The simple operation of driving up the board forces the clips to bite into and over the tongue of one board and embed themselves in the groove of the other, thus securely locking both boards together and to the channel. The tongues of the clips are slotted so that they automatically adjust themselves to the tongue and groove of the flooring.

LITERATURE AND SPECIFICATIONS—A Loxit floor bulletin fully describing the system is available upon request.

TECHNICAL SERVICE—A staff thoroughly trained in building problems is at the disposal of architects.

(Patents Issued and Pending)

LOXIT ACOUSTICAL SYSTEM

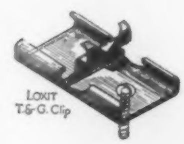
Composed of metal channel and clips forming a mechanical method of laying all types of square edged and kerfed acoustical tiles and slabs without nails or adhesives.

Also a special type of clip to be used when acoustical materials are to be applied directly to joists or furring strips.

Literature on request.

Above—Loxit Floor System

Below—Loxit Acoustical System



★

Above—Loxit Blackboard System

★

LOXIT BLACKBOARD SYSTEM

A combination Ground-Trim and Clip system using springs against which blackboards set to provide automatic adjustment required by changes due to expansion, contraction and settlement.

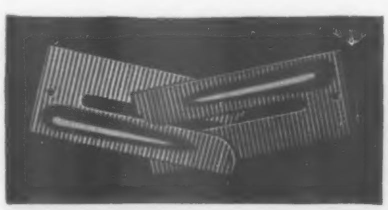
Literature on request.

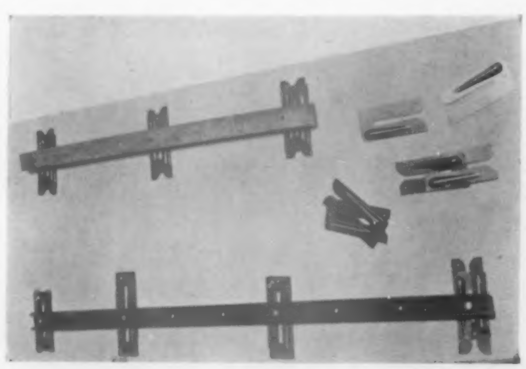
★

LOXIT INTERLOCKING METAL SHIMS

Useful for the shimming of furring, sleepers, joists, girders, jamb linings, bases, foundation plates, etc.

Write for samples and literature.





JAS. H. MATTHEWS & CO.

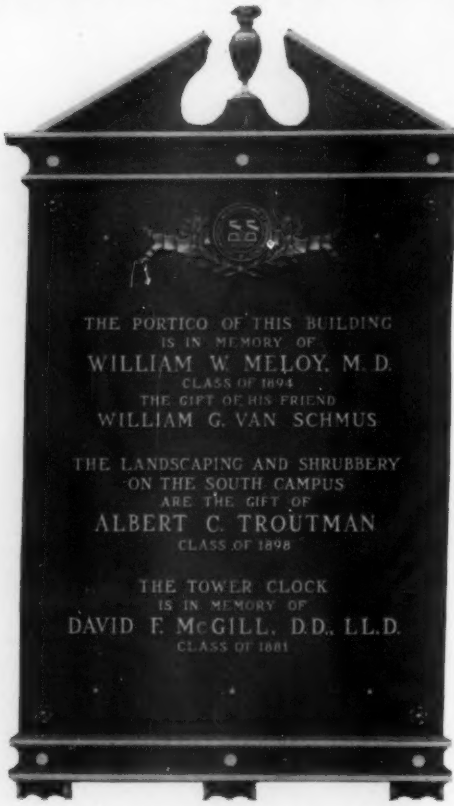
Forbes Street, Pittsburgh, Pa.

BRANCHES

NEW YORK CHICAGO PHILADELPHIA BOSTON NEWARK SYRACUSE DETROIT

DISTRICT SALES OFFICES: Cleveland Hartford Birmingham

STATUARY BRONZE TABLETS--*Standard or Created Designs*

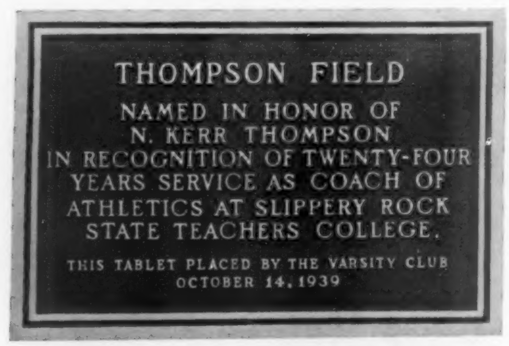


This is an example of a specially modelled design, for Washington and Jefferson College

TABLETS of this everlasting metal are especially appropriate to honor school founders, benefactors, college presidents or notable alumni. Honor rolls perpetuate the memory of Alumni who served in the armed forces of their country. Trophies symbolize achievements in research, scholarship or athletic ability.

Appropriateness and authenticity of design combined with the finest of craftsmanship is embodied in every memorial by Matthews. Master patterns in many beautiful designs are available for economy. Special designs of our creation or to your architect's drawings are executed by master sculptors.

If you will tell us approximate size and inscription, literature, sketches and prices will be mailed to you promptly.



COLONIAL DL 201 DESIGN. Because of its simple dignity and chaste beauty, this is a most popular design. Made in any desired size

ARCHITECTURAL OVERHEAD LETTERS

Solid Cast Bronze overhead or eye level letters are usually preferred to letters incised in stone because of their greater legibility and attractiveness.

The Classical Roman beveled face design letters illustrated are widely used and are available in many standard sizes for economy.

We can duplicate letters specially designed by the architect in any desired size.

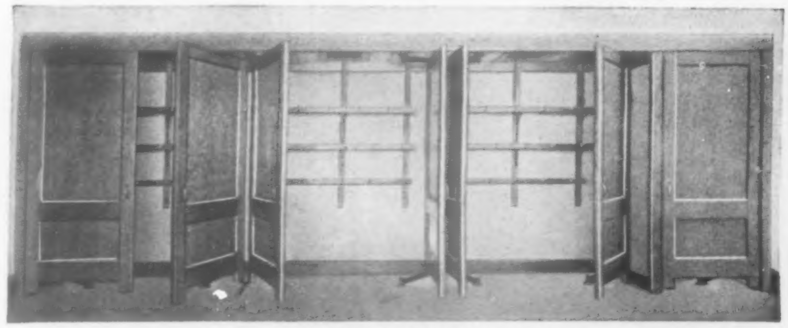
THE STANLEY WORKS

New Britain, Conn.

HARDWARE FOR SCHOOL WARDROBES

STANLEY
TRADE MARK

2705 B1—For Single Doors
2705 B2—For Pairs of Doors
With 1¼-in. clearance between door stiles and floor, and bottom rail cut out between stiles to make 4-in. clearance.
2705 C1—For Single Doors
2705 C2—For Pairs of Doors
With 4-in. clearance between door and floor.



A Typical Installation

Stanley offers complete, practical hardware for equipping doors from 18 to 48 in. in width, and any height, with a minimum depth of 25 in. from outside face of door to plaster wall. Two-foot doors project only 2 in. beyond front end of wardrobe when open, which does not hinder passage of pupils. Special hardware can be furnished for wardrobes having minimum depths to 18 in., but in such cases, two-foot doors will project up to 8 in. into the passage way.

OPERATION

Doors are hung in pairs, with single doors at the ends if desired. Pairs of doors operate in unison. It is necessary to pull only one door, to open or close both doors.

INSTALLATION

No mullions or partitions are necessary. Made to set the doors from 1¼ to 4 in. above floor. Special clearances on order. It is preferable to set the doors up from the floor to provide ventilation. The maximum space taken up in the wardrobe is 5 in. for two 1⅜-in. doors.

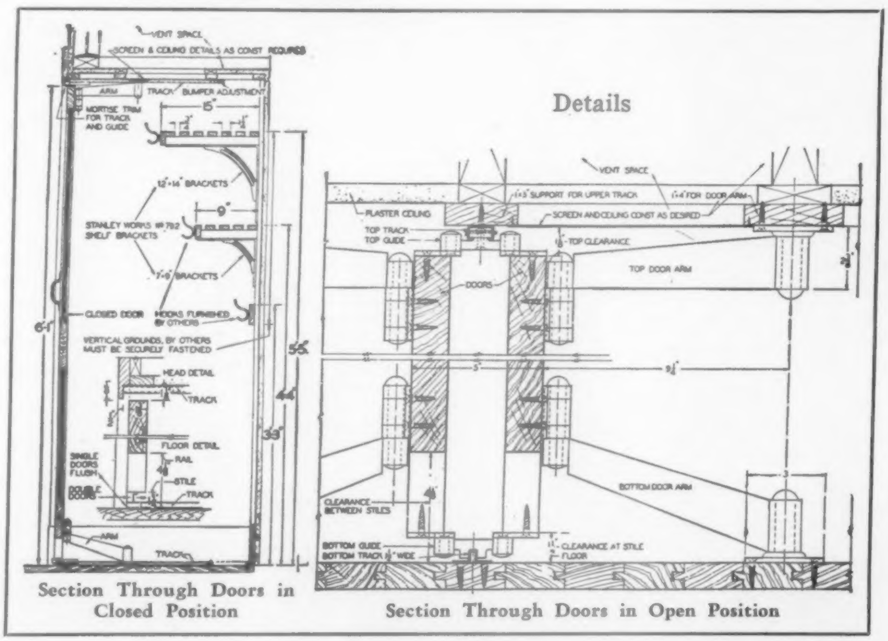
SECTIONS

The number of sections that can be had in a unit is unlimited. Three four-foot sections are usually sufficient for the average classroom, as each section provides for seventeen pupils. A single two-foot section on either end provides the teacher's locker.

HARDWARE

The extra heavy steel hinges will carry over 300 lbs. The hinge arms are 8¾ in. long, ¼ in. in thickness and set well back to avoid any tripping hazard. The pins are grooved for lubricant.

The top track and bottom rail are made of wrought steel; the guides are bronze. The bronze-on-steel bearing surface minimizes wear and insures smooth noiseless operation. Track and rail do not in any way hang or support the doors; they guide them. There is sufficient friction to prevent the doors from slamming. The track is fitted with rubber bumpers to insure quiet operation.

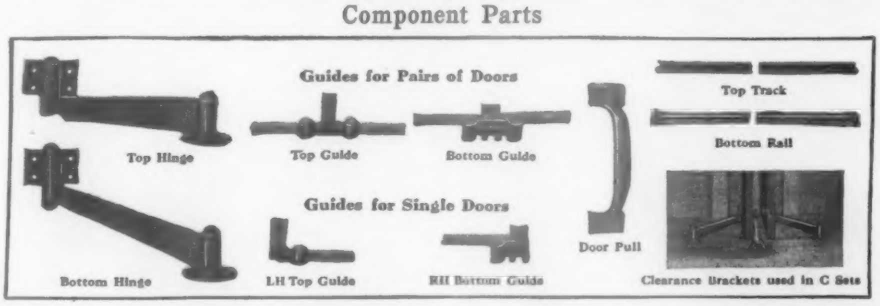


Details

Section Through Doors in Closed Position

Section Through Doors in Open Position

Component Parts



CORNELL IRON WORKS, INC.

ESTABLISHED Since 1828

36th Avenue at 12th Street, Long Island City, N. Y.

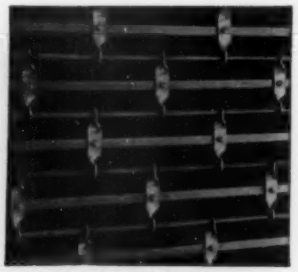
102 REPRESENTATIVES IN PRINCIPAL CITIES

Telephone: STillwell 4-3880-1-2-3

PRODUCTS

ROLLING GRILLES and GATES, in steel or other metals; SLIDING GRILLES in steel or other metals; ROLLING DOORS and SHUTTERS in steel and other metals or with non-corroding curtain bottoms; Underwriters labeled rolling STEEL FIRE DOORS; complete line of UPWARD ACTING DOORS in wood or metal; MOTOR OPERATORS.

Makers of fine doors for over one hundred and ten years. CORNELL IRON WORKS, INC., owes its origin to George Cornell, who purchased his employer's metal business July 29th, 1828, in New York City.



Close-up view of ROLLING GRILLE curtain, CORNELL Standard BUTTERFLY TYPE

CORNELL ROLLING GRILLE in school corridor, Kansas. Side guides and overhead coil are concealed in jambs and ceiling

Send for new Catalog U

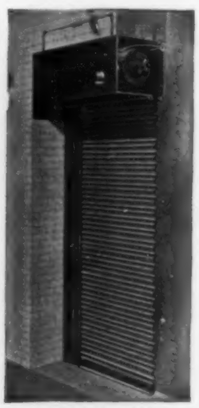
ROLLING DOORS AND ROLLING GRILLES

The doors proper are made up of interlocking metal slats running in vertical metal side guides, flexible to coil. All-steel curtains are hot galvanized.

Rolling Fire Doors are labeled by Underwriters' Laboratories, Inc., for fire walls, etc.

Cornell Iron Works, Inc., are the originators of the Rolling Grille in America. Cornell Rolling Grilles operate like rolling doors, but they do not block light, air, or vision. They have been widely accepted for school corridors, etc. Can be completely concealed when open. Rolling Grilles are made of 5/16" round hard drawn galvanized steel bars running continuous horizontally from jamb to jamb and locked into rolled steel vertical side guides. The horizontal bars are flexibly connected by unbreakable vertical steel links; permitting entire grille to coil overhead.

Patented Locking Device for Rolling Grilles; Bars throw to both sides and engage holes in backs of side guides. Padlock or cylinder lock can be furnished, workable from either side. A combination Rolling Door and grille has been designed for use where lower section is to be closed by slats and upper section is to be open grille construction to permit ventilation.



(*Above*) LABELED ROLLING STEEL (Llenroc) FIRE DOOR, coiling under lintel in the opening between the jambs. Shown in section.

Note the overhead counterbalancing shaft, used both in rolling doors and rolling grilles; and the enclosing hood. Side guides may be concealed in the wall and the overhead coil hidden in the ceiling.

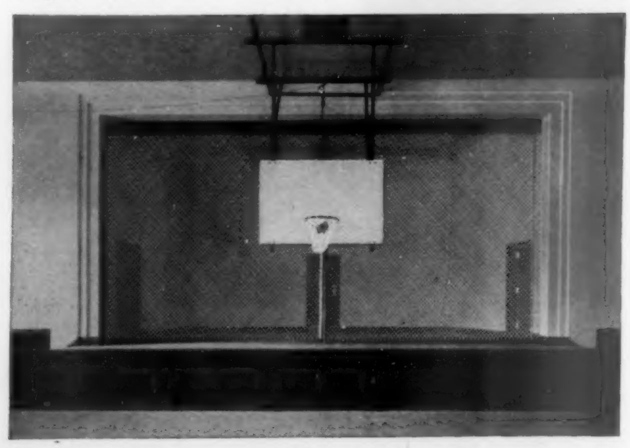
CORNELL *SLIDING* GRILLES

Cornell Sliding Grilles give high protection at exceptionally low cost. It is a patented steel curtain of heaviest galvanized chain link factory fence, extended to any height of opening by galvanized rods running to track above. The grilles can be used anywhere to keep out intruders and allow free circulation of air. The construction makes it possible to nest the sliding Grilles at the side of an opening in a space only 1/6 of the opening width. Grille will travel around a curve, and lie at a right angle to opening if there is 10" room available from edge of jamb.

Cornell Sliding Grilles are recommended for school corridors, as a low priced substitute for Rolling Grilles; for auditoriums and stages; for gymnasium and court windows, entrances, gates or partitions; and for athletic and parking areas.

(*Right*) Close-up of CORNELL *SLIDING* GRILLE
Note cap at each top joint.
Standard Size Grille, 10' x 12', complete $58.50 f. o. b. factory.

Three CORNELL ROLLING GRILLES separating locker rooms from gymnasium; Castlemont High School, Oakland, California



Showing use for large SLIDING GRILLE in combination auditorium and gym in New Jersey School

SECTION III
ARCHITECTS FOR EDUCATIONAL BUILDINGS

All the architects listed in this Directory are now at work on educational buildings or have designed a number of school and college buildings in recent years.

No attempt has been made to evaluate the skill or professional standing of the architects listed. Boards of Education and persons interested in the construction of new buildings can obtain valuable advice in this matter from the presidents of the local chapters of the American Institute of Architects, or from the national headquarters of that organization, The Octagon, Washington, D. C., and from such sources as the National Advisory Council on School Buildings, the United States Office of Education, the respective state departments of education, the Department of Education of the National Catholic Welfare Conference, and the Department of Educational Administration of Teachers College, Columbia University, New York.

Alabama

Birmingham

Henry Sprott Long, Lewis R. Paceley, Associate, Martin Bldg.
Charles H. McCauley, Jackson Bldg.
Miller, Martin & Lewis, Title Guarantee Bldg.
Jack B. Smith, Martin Bldg.
E. B. Van Keuren, Inc., Farley Bldg.
Warren, Knight & Davis, Protective Life Bldg.
Horace M. Weaver, Lyric Bldg.

Gadsden

Paul W. Hofferbert, 220 S. 8th St.
Matthews H. Tardy, 200 S. 8th St.

Mobile

Fred W. Clarke, Box 301
Roberts & Long, First National Bank Annex

Montgomery

Carl B. Cooper
R. L. Kenan & Associates, Bell Bldg.

Ozark

H. L. Holman, Jr., Holman Bldg.

Sheffield

Howard A. Griffith, Jr., 202 E. Fourth St.

Tuscaloosa

Don Buel Schuyler, First National Bank Bldg.

Arizona

Phoenix

Lescher & Mahoney, Title & Trust Bldg.

Tucson

Henry O. Jaastad, 103 Miltonberg St.
James Macmillan, 537 E. Third St.
Roy W. Place & Lew Place, 20 E. Pennington St.

Arkansas

Fayetteville

Paul Young, Jr., McIlroy Bank Bldg.

Fort Smith

Haralson & Mott, Merchants Bank Bldg.
E. Chester Nelson, Merchants Nat'l Bank Bldg.

Little Rock

Brueggeman, Swaim & Allen, Gazette Bldg.
Ginocchio & Cromwell, Hall Bldg.
Wittenberg & Delony, Pyramid Bldg.

Pine Bluff

Mitchell Selligman, National Bldg.

California

Alhambra

Richard C. Farrell, 731 N. Marguerita Ave.
Quintin & Westberg, 308 S. Garfield Ave.

Bakersfield

Charles H. Biggar, Haberfelde Bldg.
Stanton Willard, 1314 17th St.
Frank Wynkoop, Haberfelde Bldg.

Berkeley

John J. Donovan, 950 Parker St.
Dragon & Schmidts, 2068 Allston Way
Wm. C. Hays, Robert J. Evans, Associate, 2924 Derby St.
W. H. Ratcliff, 2323 Shattuck

Burlingame

E. L. Norberg, 407 Occidental Ave.

Del Monte

Robert Stanton and Thomas B. Mulvin, Hotel Del Monte

Fresno

W. D. Coates, Rowell Bldg.
Franklin & Kump, 1244 "O" St.
David H. Horn, Rowell Bldg.
H. Rafael Lake, Mattei Bldg.
E. Charles Parke, 3104 Kirckhoff St.
Fred L. Swartz, Brix Bldg.

Fullerton

Harry K. Vaughn, Chapman Bldg.

Glendale

Postle & Postle, 1900 Melwood St.

Hollywood

H. L. Gogerty, 1717 N. Vine St.

Long Beach

Warren Dedrick, Heartwell Bldg.
D. Easton Herrald, 4319 E. 11th St.
Jess J. Jones, F. & M. Bank Bldg.
Victor E. Siebert, 215 American
Kenneth S. Wing, 501 Termino Ave.

Los Angeles

M. L. Barker & G. Lawrence Ott, 624 S. LaBrea Ave.
Harold D. Cross, 124 W. 4th St.
Paul O. Davis, 417 S. Hill St.
Clifford K. Denman, 311 S. Spring St.
Ralph C. Flewelling, 816 W. 5th St.
William H. Harrison, 816 W. 5th St.
Hibbard, Gerity and Kerton, 816 W. 5th St.
Myron Hunt and H. C. Chambers, 408 S. Spring St.
C. Raimond Johnson, University of Southern California, 3551 University Ave.
Joseph Kaiser, 5849 S. Van Ness Ave.
Paul Kingsbury, 815 S. Hill St. (also in San Marino)
Kistner & Wright, Architects Bldg.
Samuel E. Lunden, Rowan Bldg.
Marsh, Smith & Powell, 816 W. 5th St.
Albert C. Martin, Higgins Bldg.
William Mellema, 1663 Beverly Blvd.
A. S. Nibecker, Jr., Board of Education, 1425 San Pedro St.
Raphael A. Nicolais, 5670 Wilshire Blvd.
Elwin P. Norberg, Board of Education, 1425 San Pedro St.
Harry L. Pierce, 1443 Mt. Pleasant St.
Thos. Franklin Power, 6834 Odin St.
Alfred W. Rea & Chas. E. Garstang, 304 South Broadway
Edward Cray Taylor and Ellis Wing Taylor, 803 W. 3rd St.

Monrovia

Robert M. Finlayson, Central Bldg.

Monterey

C. J. Ryland, 136 Bonifacio Pl.

Oakland

Will G. Corlett, Bank of America Bldg.

Palo Alto

Birge M. Clark & David B. Clark, 310 University Ave.

Pasadena

Walter C. Folland, 224 S. Oak Knoll Ave.
Frederick Kennedy, Jr., 1041 E. Green St.
Marston & Maybury, 25 S. Euclid Ave.

Richmond

Keith O. Narbett, 468 31st St.

Riverside

G. Stanley Wilson, 3681 Sixth St.

Sacramento

Chas. F. Dean, California State Life Bldg.
Harry J. Devine, Cronan Bldg.
George C. Sellon, California State Life Bldg.
Leonard F. Starks, Bank of America Bldg.

Salinas

Charles E. Butner, 7 Winham St.

San Bernardino

Worswick & Culver, Fuller Bldg.

San Diego

Frank L. Hope, Jr., San Diego Trust & Savings Bldg.
Jackson & Hamill, Bank of America Bldg.
Wm. Templeton Johnson, San Diego Trust & Savings Bldg.
Kistner & Curtis, Spreckels Theatre Bldg.
William P. Lodge, Fifth Avenue Bldg.

San Francisco

Blanchard & Maher, 369 Pine St.
Arthur Brown, Jr., 251 Kearny St.
Arnold Constable, 580 Market St.
Norman R. Coulter, 244 Kearny St.
Edwards & Schary, 704 Market St.
Walter C. Falch, Hearst Bldg.
John J. Foley, 770 Fifth Ave.
Kent & Hass, 525 Market St.
Masten and Hurd, 442 Post St.
Maybeck & White, Russ Bldg.
J. R. Miller and T. L. Pflueger, 580 Market St.
William Mooser, 244 Kearny St.
William Henry Rowe, 127 Montgomery St.
N. W. Sexton, De Young Bldg.
Harry A. Thomsen, Jr., 315 Montgomery St.

San Luis Obispo

H. B. Douglas, Santa Barbara and High Sts.

San Rafael

Carl F. Gromme, 1010 B St.

Santa Barbara
E. Keith Lockard, 117 E. De la Guerra St.

Santa Cruz
Lynn R. Duckering, 27 Front St.

Santa Maria
Crawford & Daniel, Gibson-Drexler Bldg.

Santa Paula
Roy C. Wilson, Box 951

Santa Rosa
C. A. Caulkins, Jr., Rosenberg Bldg.
William Herbert, Rosenberg Bldg.

Stockton
Elmore G. Ernst, 561 E. Harding Way
Frank V. Mayo & Eric Johnson, 931 N. Eldorado St.
Joseph Losekann, 311 E. Market St.

Colorado

Boulder
Huntington, Jones & Hunter, Citizens National Bank Bldg.

Colorado Springs
Edward L. Bunts, First National Bank Bldg.

Denver
William N. Bowman, Insurance Bldg.
T. H. Buell & Co., 730 14th St.
H. W. J. Edbrooke, Tabor Bldg.
John K. Monroe, 22nd St. & Broadway
Earl C. Morris, Midland Savings Bldg.
G. Meredith Musick, Patterson Bldg.
C. Francis Pillsbury, Midland Savings Bldg.
Gordon D. White, 615 Columbine St.

Greeley
F. W. Ireland, Jr., Colorado State College of Education

Pueblo
Walter DeMordaunt & John Gray, Thatcher Bldg.

Wheatridge
R. O. Parry, 3855 Harlan St.

Connecticut

Bridgeport
Frederick H. Beckwith, 19 Arcade St.

Danbury
Philip Nichols Sunderland, Inc., 81 West St.

Fairfield
O. C. S. Ziroli, 1330 Post Rd.

Hartford
Golden, Storrs & Co., 343 Fairfield Ave.
Carl J. Malmfeldt & Associates, 36 Pearl St.
William T. Marchant, 36 Pearl St.
John J. McMahon, 187 Barker St.
Frank W. Whiton, 550 Main St.

Litchfield
Ernest Sibley

Middletown
Carl E. Segerberg, 57 Barbara Road
W. T. Towner, 164 Court St.

New Haven
Brown & Von Beren, Inc., 295 Sherman Ave.
R. W. Foote, 157 Church St.
Dwight E. Smith, 956 Chapel St.

New London
Payne & Keefe, Manwaring Bldg.

Norwich
Chandler & Palmer, Thayer Bldg.

Stamford
Provoost & Everett, 421 Main St.

West Hartford
Russell F. Barker, 17 Staples Place

Delaware

Wilmington
Walter Carlson, Delaware Trust Bldg.
Martin & Jeffers, Inc., DuPont Bldg.

District of Columbia

Washington
Rhees E. Burket, 726 Jackson Pl.
Albert I. Cassell, 1903 14th St., N. W.
Faulkner & Kingsbury, 917 15th St.
Raymond Freeburg, 3508 Sixteenth St., N. W.
Frederick V. Murphy, 1413 H St., N. W.
Upman & Adams, 808 17th St., N. W.
A. Hamilton Wilson, 1022 20th St., N. W.
Nathan C. Wyeth, Municipal Architect, District Bldg.

Florida

Daytona Beach
Harry M. Griffin, 309 N. Grandview Ave.

Gainesville
Sanford W. Goin, 230 E. Main St.

Jacksonville
Mellen C. Greeley, Barnett National Bank Bldg.
Olof Eskil Segerberg, Box 4242
Max L. Worthley, 605 Ocean St.

Lakeland
W. B. & Thomas V. Talley, 201½ E. Lemon St.

Miami
Kiehnel & Elliott, Seybold Bldg.

Miami Beach
August Geiger, 1663 Meridian Ave.

Pensacola
Yonge & Hart, 406 Thiesen Bl.

St. Petersburg
Archie G. Parish, Empire Bldg.

Tallahassee
T. Angus MacEwen, 108 Briarcliffe Drive
Herbert D. Mendenhall, 814 N. Jefferson St.
James A. Stripling, State Department of Education

West Palm Beach
Edgar S. Wortman, Guaranty Bldg.

Winter Park
Jas. Gamble Rogers, II, Post Office Bldg.

Georgia

Atlanta
Burge & Stevens, Palmer Bldg.
Wm. J. J. Chase, 140 Peachtree St. (also in Albany, Ga.)
David S. Cuttino, Jr., and Ross H. Howard, Associate, Peters Bldg.
Daniell & Beutell, Ga. Savings Bank Bldg.
Hentz, Adler, & Shutze, Candler Bldg.
Ivey & Crook, Candler Bldg.
Henry H. Jordan, Healey Bldg.
Odis Clay Poundstone, Palmer Bldg.
Roberts and Company, Inc.
Arthur Neal Robinson, Sr. & Jr., Henry Grady Bldg.
Sayward & Logan, Palmer Bldg.
Norman F. Stambaugh, Citizens & Southern National Bank Bldg.
Jess Wilhoit, Mortgage Guarantee Bldg.

Augusta
Brown & Eve, Masonic Bldg.
F. Arthur Hazard, Masonic Bldg.
Scroggs & Ewing, Southern Finance Bldg.

Columbus
T. F. Lockwood, Box 34

Macon
Dennis & Dennis, 556 Mulberry St.
Ellamae Ellis League, Grand Bldg.

Savannah
Cletus W. Bergen, Liberty Bank Bldg.
Levy & Clarke, Liberty Bank Bldg.

Idaho

Boise
Wayland & Fennell, Box 1277

Idaho Falls
L. E. Stalker, Jennie Rogers Bldg.
Sundberg & Sundberg, Salisbury Bldg.

Lewiston
Hugh Richardson, Weisgerber Bldg.

Nampa
Lee R. Cooke, Box 448

Pocatello
Frank H. Paradice, Jr., Dietrich Bldg.

Twin Falls
Frank H. Paradice, Jr., Holmes G. Lash, Fidelity National Bank Bldg.
Andrew McQuaker, 435 2nd Ave., N.

Illinois

Alton
Deeter & Drake, 615 E. Third St.
Walter W. Wuellner, 115 Market St.

Aurora
Wybe J. van der Meer, 70 S. May St.

Belleville
Rubach & Weisenstein, 221A E. Main St.

Bloomington
Lundeen & Hilfinger, Corn Belt Bank Bldg.
Schaeffer & Hooton, Peoples Bank Bldg.

Champaign
F. E. Berger & R. L. Kelley, Lincoln Bldg.
George E. Ramey & Co., Robeson Bldg.

Chicago
William N. Alderman, 140 S. Dearborn St.
Allen & Webster, 1425 N. Dearborn St.
Gerald A. Barry, 4929 W. Augusta Blvd.
Burnham & Hammond, Inc., 160 N. La Salle St.
John D. Chubb, 109 N. Dearborn St.
John Leonard Hamilton, 814 N. Tower Court
Charles Hodgdon, 111 W. Monroe St.
Holabird & Root, 333 N. Michigan Ave.
Holmes & Flinn, 8 S. Dearborn St.
C. I. Krajewski, 612 N. Michigan Ave.
Godfrey E. Larson Inc., 77 W. Washington St.
H. T. Liebert, 5442 Winthrop Ave.
Joseph C. Llewellyn Co., 38 S. Dearborn St.
McCarthy, Smith & Eppig, 43 E. Ohio St.
Howard S. Muesse, 360 N. Michigan Ave.
Perkins, Wheeler & Will, Merchandise Mart
Clement L. Piontek, 5010 Oakdale Ave.
E. E. Roberts and Elmer C. Roberts, Inc., 22 E. Huron St.
Jos. A. Slupkowski, 3024 Haussen Ct.
Robert Work, 75 E. Wacker Drive

Decatur
S. A. Clausen, Standard Office Bldg.
Engineering Service Corporation, Decatur Club Bldg.
Charles Harris, Standard Office Bldg.

East St. Louis
Kennedy, Spencer & Goedde, First National Bank Bldg.
Knoebel & Pabst, Spivey Bldg.

Elgin
Leroy W. Thompson, 355 Congdon Ave.

Galesburg
Aldrich & Aldrich, Bondi Bldg.

Highland Park
John S. Van Bergen, 234 Cedar Ave.

Kewanee
John A. Scribbins, 110½ W. First St.

Lincoln
Deal & Deal, Box 406

Moline
M. R. Beckstrom, Reliance Bldg.
William H. Schulzke, Fifth Avenue Bldg.

Mt. Vernon
McCoy & Wilson, First National Bank Bldg.

Murphysboro
R. Z. Gill & Co., 1328½ Walnut St.

Ottawa
Louis H. Gerding, 708 LaSalle St.

Peoria
Jameson & Harrison, Alliance Life Bldg.

Rockford
Bradley & Bradley, 226 S. Main St.
Gilbert A. Johnson, 501 7th St.
Raymond A. Orput, Empire Bldg.

Rock Island
Cervin & Stuhr, Safety Bldg.
Benj. A. Horn, Rock Island Bank Bldg.

Springfield
Harry J. Reiger, Security Bldg.

Urbana
J. W. Royer, H. B. Davis, Associates, 209 S. Broadway
Smith, Kratz & Strong, 101 S. Broadway
Ernest L. Stouffer, Administration Bldg.

Waukegan
Ekstrand & Schad, 118 N. Genesee St.

Indiana

Anderson
Erwin F. Miller, Anderson Bank Bldg.
Ernest R. Watkins, Citizens Bank Bldg.

Cicero
A. A. Faulstich, Box 275

Connersville
Henkel & Hanson, 715½ Central Ave.

Crawfordsville
Carroll O. Beeson, Ben Hur Bldg.

Crown Point
Albert E. Turner, 116 N. East St.

East Chicago
Michael S. Bittner, 723 W. Chicago Ave.
C. I. Botteron, 4005 Main St.
Karl D. Norris, Calumet Bldg.

Evansville
Edwin C. Berendes, 121 N.W. 4th St.
Harry E. Boyle & Co., Court Bldg.

Fort Wayne
Le Roy Bradley, 225 E. Berry St.
Albert Heeter, Lincoln Tower

Frankfort
Leonard & Wolf, 59 S. Jackson St.

Gary
Joe H. Wildermuth & Co., 527 Broadway

Hammond
L. Cosby Bernard & Co., 7241 Forest Ave.
W. S. Hutton, 5231 Hohman Ave.

Indianapolis
D. A. Bohlen & Son, Majestic Bldg.
Everett I. Broun, 429-31 Circle Tower
Burns & James, 333 N. Penn St.
Herbert Foltz & Son, Architects & Builders Bldg.
McGuire & Shook, Fletcher Trust Bldg.
C. Daniel J. Zimmerman, Inc. & Associates 3538 N. Meridian St.

Kentland
John A. Bruck, Box 205

Lafayette
Walter Scholer, 1114 State St.

Logansport
Henry C. Wolf, 316 Heath St.

Michigan City
Phelps & Peck, Inc., 622½ Franklin St.

New Albany
Hawkins & Walker, Elsby Bldg.

Richmond
Werking & Son, 11 N. 20th St.

South Bend
Austin & Shambleau, J. M. S. Bldg.
Willard M. Ellwood, Christman Bldg.
Maurer & Maurer, 107 Lincoln Way, E.
Callix E. Miller, Court House Basement
Ernest W. Young, Sherland Bldg.

Terre Haute
Miller & Yeager, Opera House Bldg.

Vincennes
Lester W. Routt, Citizens Trust Bldg.

Westport
O. W. Holmes

Iowa

Ames
Allen Holmes Kimball, Iowa State College

Burlington
Robin B. Carswell, F. & M. Bank Bldg.

Cedar Rapids
Mark Anthony, O.R.C. Bldg.
W. J. Brown, Higley Bldg.
Norman Hatton, Higley Bldg.
Chas. B. Zalesky, Mer. Nat'l Bank Bldg.

Davenport
Arthur H. Eberling, Kahl Bldg.
Kruse & Parish, Kahl Bldg.
Seth J. Temple–Arthur Temple, Union Bank Bldg.

Decorah
Charles Altfillisch, 126½ W. Water St.

Des Moines
Ralph Arnold, Board of Control of State Institutions
Dougher, Rich & Woodburn, Old Colony Bldg.
Keffer & Jones, Masonic Temple.
Proudfoot Rawson—Brooks & Borg, Hubbell Bldg.
Oren Thomas, Des Moines Bldg.
Tinsley, McBroom & Higgins, Hubbell Bldg.

Forest City
Thorwald Thorson

Fort Dodge
E. O. Damon, East Mason Bldg.
Frank W. Griffith, Snell Bldg.

Iowa City
Geo. L. Horner, State University of Iowa

Marshalltown
Russell J. Prescott, 17½ W. Main St.

Mason City
Hansen & Waggoner, 11½ S. Federal Ave.

Sioux City
Beuttler & Arnold, Insurance Exchange Bldg.

Waterloo
Mortimer B. Cleveland, 424 E. 4th St.

Kansas

Abilene
Frank H. Cayton, Citizens Bank Bldg.

Chanute
Wolpert & Newcomb, Mercantile Bldg.

Clay Center
Hal Wheelock, 1405 Fifth St.

Emporia
A. E. Buck, 1019 Walnut St.
W. F. Marx, 715 Commercial St.

Hutchinson
Harold T. English, Nelson Bldg.
Otho McCracken, 308 W. 20th St.
Mann & Co., Box 529

Ottawa
C. A. Washburn, 220½ S. Main

Parsons
Gordon Shattuck
Thos. W. Williamson & Co., Box 319

Salina
Chas. W. Shaver, United Life Bldg.

Topeka
Cuthbert & Suehrk, 735 Kansas Ave.
W. E. Glover, National Reserve Bldg.

Wichita
Herbert C. Anset, 1120 S. Emporia Ave.
Forsblom & Parks, Beacon Bldg.
Overend & Boucher, Brown Bldg.
Clarence C. Robinson, 540 S. Madison St.
Lorentz Schmidt, 1832 E. 2nd St.
Glen H. Thomas, 125½ N. Topeka Ave.

Kentucky

Bowling Green
J. M. Ingram, 919 Park St.

Frankfort
C. Julian Oberwath, 301 2nd St.

Hazard
H. A. Spalding

Hopkinsville
John T. Waller, 1700 S. Virginia St.

Lexington
Frankel & Curtis, McClelland Bldg.
John T. Gillig, 234 E. Short St.
Hugh Meriwether, 236 E. Short St.
John F. Wilson, 131 W. Short St.

Louisville
E. T. Hutchings, Heyburn Bldg.
Joseph & Joseph, Breslin Bldg.
D. X. Murphy & Bro., Louisville Trust Bldg.
Thomas J. Nolan & Son, Fifth and Jefferson
W. Earle Otis, Speed Bldg.
Arthur G. Tafel, 140 S. 3rd St.

Owensboro
Walter Scott Roberts, 115 E. 4th St.

Paducah
G. Tandy Smith, Jr., Box 706

West Covington
B. T. Wisenall, 1210 Highway

Louisiana

Alexandria
Herman J. Duncan & Co., Inc., Rapides Bank Bldg.
Max J. Heinberg, Box 1694
Charles T. Roberts, Guaranty Bank Bldg.

Baton Rouge
Bodman & Murrell, Reymond Bldg.
Robert H. Goodman, Wieck Bldg.
George Anthony Thompson, 424 State St.

Lafayette
Favrot & Reed, Frederick J. Nehrbass, Associate, 123 Edgewood Terrace

Lake Charles
Dunn & Quinn, 827 Hodges

Monroe
J. W. Smith & Associates, Ouachita National Bank Bldg.

New Orleans
William R. Burk, Balter Bldg.
Edgar A. Christy, Orleans Parish School Board, 703 Carondelet St.
Diboll-Kessels & Associates, Baronne Bldg.
Favrot & Reed, Nola Bldg.
Moise H. Goldstein & Associates, American Bank Bldg.
William T. Nolan, Queen & Crescent Bldg.
Carl L. Olschner, Pere Marquette Bldg.
Allison Owen, Canal Bldg.
Theo. L. Perrier, Baronne Bldg.
Wogan & Bernard, Baronne Bldg.

Shreveport
Stanley Brown, Box 537, Queensborough Station
Samuel G. Wiener, C. N. B. Bldg.

Maine

Augusta
Bunker & Savage, 256 Water St.
Bangor
Crowell & Lancaster, 6 State St.

Maryland

Baltimore
O. Eugene Adams, 329 N. Charles St.
John A. Ahlers, 4810 Roland Ave.
Wm. W. Emmart, Munsey Bldg.
Bernard Evander, 6108 Stuart Ave.
Clyde N. & Nelson Friz, Lexington Bldg.
David Harrison, 421 St. Paul St.
Harry L. Katz, 3212 Gwynns Falls Park, Professional Bldg.
Frederick L. W. Moehle & Associates, Perring & Remington, 10 W. Chase St.
Smith & May, Baltimore Trust Bldg.
Taylor & Fisher, 1012 N. Calvert St.
Hagerstown
A. J. Klinkhart, Franklin Court
Hyattsville
Kea, Ross & Walton
Salisbury
Edwin Wilson Booth, Market St.
Malone & Williams
Takoma Park
Ronald Senseman, 1100 Carroll Ave.

Massachusetts

Boston
Andrews, Jones, Biscoe & Whitmore, 50 Congress St.
Appleton & Stearns, 53 State St.
J. Williams Beal, Sons, 185 Devonshire St.
Francis D. Bulman, 1078 Boylston St.
Coolidge & Carlson, 89 State St.
Coolidge, Shepley, Bulfinch & Abbott, 1 Court St.
Desmond & Lord, 6 Beacon St.
William W. Drummey & Co., 168 Dartmouth St.
M. A. Dyer Co., 8 Beacon St.
Charles R. Greco, Inc., 11 Beacon St.
Hutchins & French, 11 Beacon St.
Kilham, Hopkins & Greeley, 126 Newbury St.
Leland & Larsen, 20 Providence St.
Markus & Nocka, 184 Boylston St.
McLaughlin & Burr, 60 Congress St.
Perry, Shaw & Hepburn, 141 Milk St.
Isidor Richmond, 248 Boylston St.
James H. Ritchie & Associates, 20 Newbury St.
Arthur Rosenstein, 120 Milk St.
Louis Warren Ross, 20 Kilby St.
Richard Shaw, 25 Huntington Ave.
George H. Sidebottom, 120 Milk St.
Fall River
Israel T. Almy, 56 N. Main St.
E. M. Corbett, 49 Purchase St.
Fitchburg
S. W. Haynes & Associates, 336 Main St.
Greenfield
James A. Britton, 78 Federal St.
Bernhard Dirks, 20 Federal St.
Haverhill
Morse & Dickinson & Goodwin, 25 Washington Sq.
Lawrence
Ashton & Huntress, 477 Essex St.
Leominster
Harold E. Mason, 15 Prospect St.
Lynn
George A. Cornet, 14 Central Ave.
Milton
Frank Irving Cooper Associates, 554 Pleasant St.
Newton
Edmund I. Leeds, 46 Waverly Ave.
Northampton
Frank Mark Mahoney, 199 Main St.
Norwood
William G. Upham, Bigelow Bldg.
Springfield
Morris W. Maloney, 220 Dwight St.
Henry J. Tessier, 220 Dwight St.
Worcester
O. E. Nault & Sons, 48 Hamilton St.

Michigan

Battle Creek
A. B. Chanel, 9 Merwood Drive
Lewis J. Sarvis, Bailey Bldg.
Bay City
Joseph C. Goddeyne, Bay City Bank Bldg.
Bloomfield Hills
Eliel & Eero Saarinen
Dearborn
Bennett & Straight, Schaefer Bldg.
Harry C. Vicary, 22148 Michigan Ave.
Detroit
Derrick & Gamber, Inc., Union Guardian Bldg.
George F. Diehl, 120 Madison St.
J. Ivan Dise, 2631 Woodward Ave.
Jensen & Keough, 3757 Gladstone Ave.
Lane-Davenport-Meyer, Donovan Bldg.
Lyndon & Smith, Murphy Bldg., Highland Park
McGrath & Dohmen, 2631 Woodward Ave.
Malcolmson, Calder & Hammond, Inc., 1217 Griswold St.
G. M. Merritt & Lyle S. Cole, 1111 Collingwood Ave.
C. William Palmer, 243 W. Congress St.
Edward A. Schilling, 409 Griswold St.
George L. W. Schulz, 1354 Broadway
Shreve, Anderson & Walker, Marquette Bldg.
Smith, Hinchman & Grylls, Inc., Marquette Bldg.
N. Chester Sorensen Co., Industrial Bank Bldg.
B. C. Wetzel & Co., Dime Bank Bldg.
Flint
Geo. J. Bachman & C. G. Finster, Dryden Bldg.
Grand Rapids
Roger Allen, Grand Rapids National Bank Bldg.
Knecht, McCarty & Thebaud, Inc., Watson Bldg.
Henry H. Turner, 1620 Sherman St.
Kalamazoo
Stewart-Kingscott Co., 208 Elm St.
Lansing
Lee Black & Kenneth C. Black, Capitol Savings & Loan Bldg.
Herrick & Simpson, Bauch Bldg.
Warren S. Holmes Co., Olds Tower Bldg.
Marquette
David E. Anderson, 301 Nester Blk.
Menominee
Hubert & Gjelsteen, 1065 Sheridan Rd.
Port Huron
Walter H. Wyeth, Peoples Bank Bldg.
Royal Oak
Frank D. Madison, Wayne-Oakland Bank Bldg.
Saginaw
Samuel C. Allen, Eddy Bldg.
Frederick Beckbissinger, 304 Carroll St.
Donald A. Kimball, 2345 Delaware Blvd.
St. Johns
R. V. Gay
Traverse City
Ralph L. Bauer, State Bank Bldg.
Wayne
Brender & Van Reyendam
Ypsilanti
R. S. Gerganoff, 206 N. Washington St.

Minnesota

Albert Lea
LeRoy Gaarder, Hyde Bldg.
Austin
Allen H. Meinecke, 129 N. Main St.
Duluth
E. F. Broomhall, Box 472
Erickson & Co., 1911 E. 2nd St.
Giliuson & Ellingsen, Torrey Bldg.
A. Reinhold Melander, Alworth Bldg.
Thomas J. Shefchik, Lonsdale Bldg.
C. H. Smith, Torrey Bldg.
Fergus Falls
Foss & Co., 415 South Mill
Hibbing
J. C. Taylor, 902 Minnesota St.
Mankato
Pass & Rockey, 124½ E. Jackson St.
Minneapolis
E. B. Croft, 1004 Marquette Ave.
Walter R. Dennis, 1108 Nicollet Ave.
E. H. Enger, Board of Education, 811 N. E. Broadway
Haxby & Bissell, 1111 Nicollet Ave.
Jacobson & Jacobson, Sexton Bldg.
Lang & Raugland, Wesley Temple Bldg.
Larson & McLaren, Foshay Tower
Pesek & Shifflet, 914 Marquette Ave.
Edmund J. Prondzinski, Plymouth Bldg.
New Ulm
Albert G. Plagens, 300 N. State St.
St. Cloud
Frank W. Jackson, Granite Exchange Bldg.
Louis C. Pinault
St. Paul
Frank A. Abrahamson, Endicott Bldg.
William L. Alban, Endicott Bldg.
Chas. A. Bassford, City Architect, Court House
P. C. Bettenburg & Co., 1437 Marshall Ave.
Carl H. Buetow, 570 N. Snelling Ave.
Eugene D. Corwin, Guardian Bldg.
Ellerbe & Co., First National Bank Bldg.
Ray R. Gauger & Co., 2635 University Ave.
Hausler & Fridlund, 1591-93 University St.
William M. Ingemann, Anchor Bldg.
Clarence H. Johnston, Empire Bank Bldg.
James C. Niemeyer, 1075 Lombard Ave.
Eugene V. Schaefer, Shubert Bldg.
Slifer & Cone, Endicott Bldg.
Toltz, King & Day, Inc., Pioneer Bldg.
Winona
Boyum, Schubert & Sorensen (also in La Crosse, Wis.)

Mississippi

Biloxi
John T. Collins, Fayard Bldg.
Gulfport
Shaw & Woleben, Salloum Bldg.
Vinson B. Smith Jr., Hewes Bldg.
Hattiesburg
Landry & Matthes, 218 W. Pine St.
Jackson
Fort & White, Deposit Guaranty Bank Bldg.
Hull & Drummond, First Federal Bldg.
E. L. Malvaney, Millsaps Bldg.
R. W. Naef, 411½ E. Capitol St.
N. W. Overstreet, 201 N. Lamar St.
James M. Spain, Deposit Guaranty Bldg.
Meridian
Krouse & Brasfield, Kidder Bldg.
Pascagoula
Hearon & McCleskey, Box 66 (also in Hattiesburg, Miss.)

Starkville
Stevens & Johnson

Missouri

Cape Girardeau
J. Carl Jourdan, 127 N. Frederick St.

Jefferson City
Louis Edwin Fry, 407 Lafayette St.

Kansas City
Besecke, Swanson & Terney, Reliance Bldg.
Samuel W. Bihr, Jr., 912 Baltimore Ave.
Carroll & Dean, R. A. Long Bldg.
Edward M. Fuller, 1012 Baltimore Ave.
Frederick C. Gunn, National Fidelity Life Bldg.
Hardy & Schumacher, Scarritt Arcade
Keene & Simpson, 15 W. 10th st.
Arthur Kriehn, 4638 Millcreek Parkway
Marshall & Brown, 114 W. 10th St.
H. D. Pampel, Finance Bldg.
Morton Payne & Russell Field, Inc., 845 W. 57th St.
Sayler & Owen, 1207 Grand Ave.
Joseph B. Shaughnessy, Reliance Bldg.
Chas. A. Smith, Finance Bldg.
Wight & Wight, 14 W. 10 St.

Moberly
Ludwig Abt, Riegel Bldg.

St. Joseph
Walter Boschen, 517½ Francis St.
Eckel & Aldrich, Corby Bldg.
Everett Johns, Empire Trust Bldg.
Eugene R. Meier, Bartlett Bldg.

St. Louis
Macon A. Abbitt, 315 N. 7th St.
Bonsack & Pearce, Inc., 408 Olive St.
Marcel Boulicault, 411 N. 7th St.
Hugo K. Graf, 2825 Olive St.
Henry P. Hess, Ambassador Bldg.
P. John Hoener, 3415 S. Kingshighway
Wm. B. Ittner, Inc., 911 Locust St.
Jamieson & Spearl, Arcade Bldg.
La Beaume & Klein, 315 N. 7th St.
Murphy & Wischmeyer, 911 Locust St.
P. M. O'Meara & Associates, 5709 Waterman Ave.

Springfield
Earl Hawkins, McDaniel Bldg.
Johnson & Robinett, Landers Bldg.
Dan R. Sandford, Woodruff Bldg.

Montana

Billings
Chandler C. Cohagen, Hedden Bldg.
Cushing & Terrell, Box 1776
J. G. Link & Co., Electric Bldg.
Edwin G. Osness, 2714 10th Ave., N.

Bozeman
Fred F. Willson, Box 497

Butte
R. C. Hugenin & Associates, 1201 W. Porphyry St.

Great Falls
Cottier & Herrington, First National Bank Bldg.
A. V. McIver, Box 1945
Shanley & van Teylingen, Medical Arts Bldg.

Helena
Orr Pickering, Union Bank Bldg.

Kalispell
Fred A. Brinkman, Whipps Block

Missoula
H. E. Kirkemo, Lehsou Block

Nebraska

Kearney
John P. Helleberg, 2302 Central Ave.
McClure & Walker, 2111½ Central Ave.

Lincoln
Fritz Craig, Stuart Bldg.
Davis & Wilson, Stuart Bldg.
N. Bruce Hazen, Stuart Bldg.
Meginnis & Schaumberg, Federal Securities Bldg.
J. F. Reynolds, 1637 S. 11th St.

North Platte
C. C. Coursey, 517½ Dewey St.

Omaha
N. R. Brigham, Keeline Bldg.
Everett S. Dodds, 6601 Florence Blvd.
Lahr & Stangel, W. O. W. Bldg.
John Latenser & Sons, Inc., 1307 Farnham St.
John & Alan McDonald, Standard Oil Bldg.
Chas. W. Steinbaugh, Brandeis Theatre Bldg.

Scottsbluff
O. J. Hehnke, 213 E. 16th St.

Nevada

Reno
DeLongchamps & O'Brien, Gazette Bldg.
Gulling & Means, Clay Potters Bldg.

New Hampshire

Durham
Huddleston & Hersey

Hanover
Jens Fredrick Larson, 27 E. Wheelock St.
Wells, Hudson & Granger, Main St.

Portsmouth
M. E. Witmer, 3 Hillside Drive

New Jersey

Camden
Joseph Norman Hettel, 501 Cooper St.
F. Herbert Radey, 101 N. 7th St.

Cliffside Park
Harry Lucht, 90 Washington Ave.

Elizabeth
Leslie M. Dennis, 333 N. Broad St.

Englewood
Lawrence C. Licht, 101 W. Palisade Ave.

Fort Lee
Hacker & Hacker, Fort Lee Trust Bldg.

Hackensack
Arthur E. Dorè, 332 River St.
George Nordham, 241 Main St.

Hazlet
Frederic Fessler, Holmdel Road

Irvington
Victor H. Strombach, 1243 Springfield Ave.

Paterson
Fanning & Shaw, 49 Ward St.

Plainfield
Ernest Thornell Brown, 201 E. 5th St.
Alfred M. Korff, 203 Park Ave.

Trenton
Louis S. Kaplan, 33 W. State St.
Hugh A. Kelly, 219 E. Hanover St.
Wm. W. Slack & Son, 1401 W. State St.

Union
Frederick A. Elsasser, 1000 Stuyvesant Ave.

West New York
Frank J. Ricker, 6115 Hudson Ave.

New Mexico

Albuquerque
Brittelle & Ginner, K. of P. Bldg.
Louis G. Hesselden, 403 N. 12th St.

Clovis
Robert E. Merrell, Box 852
Jerry M. Schaefer, 1208 Pile St.

Roswell
Voorhees & Standhardt

Santa Fe
Kruger & Clark, Box 308
John Gaw Meem, Hugo Zehner and Associates, Box 628
Gordon F. Street, 805 Allendale St.

New York

Albany
H. O. Fullerton, 152 Washington Ave.
Gander, Gander & Gander, 17 Steuben St.
Galen Nichols, 93 State St.
Office of Walter P. R. Pember, 24 James St.
J. Russell White, 109 State St.

Amsterdam
Howard F. Daly, 15 E. Main St.

Auburn
Wallace P. Beardsley, 96 Genesee St.

Binghamton
Conrad & Cummings, 99 Collier St.
A. T. Lacey & Sons, 52 Exchange St.
Walter H. Whitlock, 609 Chenango St.,

Brooklyn
Eric Kebbon, Supt. of School Bldgs., New York City, 49 Flatbush Ave. Extension
Joseph Mathieu, 50 Court St.
Henry V. Murphy, 1 Hanson Pl.

Buffalo
Bley & Lyman, 505 Delaware Ave.
Paul H. Harbach & James W. Kideney, 505 Franklin St.
Daniel G. McNeil, 1080 Parkside
Roswell E. Pfohl, 187 Niagara St.
Karl G.—William H. Schmill, Prudential Bldg.

Cortland
Carl W. Clark, State Theatre Bldg.

Fayetteville
Gordon Wright, 315 E. Genesee St.

Harrison
Robert P. Vignola, 231 Harrison Ave.

Herkimer
R. E. Sluyter, 203 N. Washington St.

Kingston
Teller & Halverson, 280 Wall St.

Middletown
Robert R. Graham, 25 Prospect St.

Newburgh
Gordon S. Marvel, 216 Grand St.

New York
Adams & Prentice 40 E. 41st St.
Grosvenor Atterbury, 139 E. 53rd St.
Wesley Sherwood Bessell, 25 W. 51st St.
William J. Boegel, 516 Fifth Ave.
Coffin & Coffin, 125 E. 46th St.
Corbett & MacMurray, 130 W. 42nd St.
Crow, Lewis & Wick, 200 5th Ave.
Eggers and Higgins, 542 Fifth Ave.
Randolph Evans, 140 Nassau St.
William Gehron, 101 Park Ave.
Archibald F. Gilbert, 358 5th Ave.
Alfred Morten Githens and Francis Keally, 101 Park Ave.
Godwin, Thompson & Patterson, 28 W. 44th St.
Harrison, Fouilhoux & Abramovitz, 45 Rockefeller Plaza
William E. Haugaard, Commissioner of Architecture, 80 Centre St.
Edward Shephard Hewitt, 32 E. 57th St.
Thomas H. Irving, 261 Broadway
Louis E. Jallade, 597 5th Ave.
A. H. Knappe & Associates, 192 Lexington Ave.
Archibald G. Lamont, 156 5th Ave.
B. Francis McGuire, 466 Lexington Ave.
Frederick Mathesius, 101 Park Ave.
McKim, Mead & White, 101 Park Ave.
Moore & Hutchins, 11 East 44th St.
John Muller, 10 E. 40th St.
Robert J. Reiley, 62 W. 45th St.
James Gamble Rogers, Inc., 156 E. 46th St.
Shreve, Lamb & Harmon, 11 E. 44th St.
Sloan & Behrens, 420 Lexington Ave.

John J. Stanton, 160 Fifth Ave.
Starrett & Van Vleck, 267 5th Ave.
Tooker & Marsh, 101 Park Ave.
Office of Hobart Upjohn, Grand Central Terminal
Van der Gracht & Kilham, 224 E. 49th St.
Theodore Visscher & James Burley, 51 E. 42nd St.
Voorhees, Walker, Foley & Smith, 101 Park Ave.
Franklin B. Ware, 1170 Broadway
Harold G. Webb, 101 Park Ave.
York & Sawyer, 100 E. 42nd St.

Olean

A. W. E. Schoenberg

Plattsburg

Alvin W. Inman, 27 Clinton St.

Poughkeepsie

Don P. Emley, 49 Market St.

Rochester

Carl C. Ade, 80 East Ave.
Lewis J. Brew, 42 East Ave.
Charles A. Carpenter, 45 Exchange St.
Dryer & Dryer, 2550 East Ave.
William G. Kaelber and L. A. Waasdorp, 311 Alexander St.
George F. Lorenz, 3086 St. Paul Blvd.
Francis R. Scherer, 13 S. Fitzhugh St.
Smith & Stickney, 154 East Ave.

Rome

F. W. Kirkland, American Block

Syracuse

Paul Hueber, Starrett-Syracuse Bldg.
Melvin L. & Harry A. King, Denison Bldg.
Randall & Vedder, S. A. & K. Bldg.
D. Kenneth Sargent, Starrett-Syracuse Bldg.

Utica

Bagg & Newkirk, 258 Genesee St.
Edward J. Berg, 704 Washington St.

Valley Stream

Frederic P. Wiedersum, 240 Rockaway Ave.

Watertown

The William T. Field Engineers, Inc., Flower Bldg.
Office of David D. Kieff, C. of C. Bldg.

West Hempstead

W. H. Spaulding, 22 Stevens Ave.

Wyandach

Hugo H. Avolin, Belmont Road

North Carolina

Asheville

S. Grant Alexander & Associates, 205 College St.
Henry Irven Gaines, 92 Patton Ave.
Ronald Greene, Arcade Bldg.

Black Mountain

A. Lawrence Kocher, Black Mountain College

Charlotte

Louis H. Asbury, Commercial Bank Bldg.
Chas. W. Connelly, Builders Bldg.
Walter W. Hook, Commercial Bldg.

Durham

R. R. Markley, Geer Bldg.

Elkin

J. M. Franklin, Box 28

Goldsboro

A. J. Maxwell, Jr., Borden Bldg.

Greensboro

W. L. Brewer, Dixie Bldg.
Charles C. Hartman
Leon McMinn, Southeastern Bldg.
Albert C. Woodroof, Jefferson Bldg.

Henderson

Eric G. Flannagan, McCoin Bldg.

Hendersonville

Erle G. Stillwell, Inc., Box 1056

Hickory

Robt. L. Clemmer, Grant Bldg.

High Point

Voorhees & Everhart, 308½ N. Main St.

Leaksville

James W. Hopper, 234 W. Washington St.

Lenoir

Clarence P. Coffey & Bernard Olson, Box 368

Louisburg

M. Stuart Davis

Monroe

I. J. Tucker, Box 413

Raleigh

Wm. Henley Deitrick, 115 W. Morgan St.
Ross Shumaker, Box 5445

Shelby

Breeze & Rivers, Lineberger Bldg.

Statesville

Roger C. McCarl, Stearns Bldg.

Wilmington

Leslie N. Boney, Murchison Bldg.
Lynch & Foard, 202½ Princess St.

Wilson

Frank W. Benton, Municipal Bldg.
Thomas B. Herman

Winston Salem

Harold Macklin, 620½ W. 4th St.
Northup & O'Brien, Reynolds Bldg.
William Roy Wallace, Reynolds Bldg.

North Dakota

Fargo

Braseth & Houkom, 716 S. 7th St.
Knute A. Henning, 1103 N. 2nd St.
William F. Kurke, 1117 13th Ave., N.

Grand Forks

Theodore B. Wells, Northern Hotel

Jamestown

Gilbert R. Horton, Box 1217

Minot

G. H. Bugenhagen
E. W. Molander, First Avenue Bldg.
Ira L. Rush, R.F.D. No. 4

Ohio

Akron

Leroy W. Henry, 247 E. Exchange St.
M. M. Konarski, 1100 Merriman Rd.
William Boyd Huff, 640 N. Main St.
M. P. Lauer, 31 N. Summit St.

Ashtabula

Clarence V. Martin, Johnson Bldg.

Athens

Wm. J. Davis, Security Bank Bldg.
Thomas Larrick, Ohio University Architect, 78 Mill St.

Berea

Mellenbrook, Foley & Scott, 26 Front St.

Bowling Green

S. P. Stewart & Son, 135 W. Wooster St.

Canton

Charles E. Firestone & Laurence J. Motter, 1412 Cleveland Ave., N.W.
Harry C. Frank, Canton Bldg.

Cincinnati

Charles Frederick Cellarius, St. Paul Bldg.
Grunkemeyer & Sullivan, 3717 Eastern Ave.
E. C. & G. T. Landberg, 114 Garfield Pl.
Potter, Tyler & Martin, 35 East Seventh St.

Cleveland

Walter G. Caldwell, Engineers Bldg.
George Fox, Union Commerce Bldg.
Harry A. Fulton, 5716 Euclid Ave.
Hay, Simpson & Hunsicker, 7829 Euclid Ave.
James William Thomas, 3868 Carnegie Ave.
Walker & Weeks, 1240 Huron Rd.
Franz Z. Warner, Bulkley Bldg.

Cleveland Heights

William Koehl, 3091 Mayfield Rd.

Columbus

John Quincy Adams, 33-35 S. Champion Ave.
Fred Fornoff, 55 E. State St.
F. F. Glass, 20 S. 3rd St.
Robert S. Harsh, 145 N. High St.
Edward Kromer, Board of Education, 270 E. State St.
Richards, McCarty & Bulford, 584 E. Broad St.
Howard Dwight Smith, 1950 Arlington Ave., Upper Arlington
Claude W. Youst, 55 E. State St.

Coshocton

Fred D. Jacobs, 514 Main St.

Dayton

Rial T. Parrish, U. B. Bldg.
Walker, Norwick & Templin, American Bldg.

Defiance

Philip T. Sherman, 650 W. First St.

Elyria

Silsbee & Smith, Turner Bldg.

Forest

Burk & Seebach

Fremont

C. H. Shively, 400½ Croghan St.

Grand Rapids

W. Howard Manor, E. Main St.

Hamilton

Geo. Barkman, 20 N. 6th St.

Lancaster

Ralph E. Crook

Lima

Thomas D. McLaughlin & Associates, Dominion Bldg.

Mansfield

Althouse & Jones, Farmers Bank Bldg.
Vernon Redding & Associates, Walpark Bldg.

Marion

Moore & Denman, 132 E. Center St.

Nelsonville

William Mills & Son, Citizens Central Bank Bldg.

Newark

Merle T. Orr, 77 Granville St.

New Philadelphia

Charles J. Marr, N. Broadway

Portsmouth

Devoss & Donaldson, National Bank Bldg.

Sandusky

Harold Parker, 230 E. Market St.

Sidney

F. E. Freytag, Orbison Hill

Steubenville

Fred H. Clarke, National Exchange Bank Bldg.

Tiffin

Lynn Troxel, Laird Bldg.

Toledo

Britsch & Munger, Nicholas Bldg.
Hahn & Hayes, 723 Adams St.
Jokel-Coy-Thal, 320 Ontario St.
Mills, Rhines, Bellman & Nordhoff, Inc., 518 Jefferson Ave.

Warren

Keich & O'Brien, Union Bank Bldg.

Youngstown

Myron N. Goodwin—H. Walter Damon & P. Arthur D'Orazro, Associates, Union National Bank Bldg.
O. J. Kling, 100 E. Rayen Ave.

Oklahoma

Ada
Albert S. Ross, Cummings Bldg.

Ardmore
Harold F. Flood, Gilbert Bldg.
J. B. White, Box 55

Chickasha
Paul Harris, 1503 S. 19th St.

Enid
R. W. Shaw, Bass Bldg.

Muskogee
Jos. I. Davis, Baltimore Hotel
J. J. Haralson, Manhattan Bldg.
H. H. Niemann, 1155 Summit St.

Norman
Joe E. Smay, University of Oklahoma

Oklahoma City
Leonard H. Bailey, Colcord Bldg.
Forrest Butler, Terminal Bldg.
Dennis E. Donovan, 618 N.W. 23rd St.
Ed. Hudgins, Cotton Exchange Bldg.
Noftsger & Lawrence, 2507 N.W. 23rd St.
Parr & Aderhold, Hales Bldg.
Sorey, Hill & Sorey, First National Bldg.
Walter T. Vahlberg, Peraine Bldg.
Winkler & Reid, Oklahoma Savings Bldg.

Ponca City
G. J. Cannon, Community Bldg.

Shawnee
Hugh W. Brown, Jr., Petroleum Bldg.

Spavinaw
A. J. Love & Co.

Stillwater
Philip A. Wilber, 315 Knoblock St.

Tulsa
A. M. Atkinson, Thompson Bldg.
Ralph M. Black, Kennedy Bldg.
John O. Bradley, 215 E. 13th Place
Frederick Vance Kerschner, 2503 E. 21st St.
Jos. R. Koberling, 1400 S. Boston Ave.
Frank C. Walter, Midco Bldg.

Oregon

Eugene
Graham B. Smith, Register-Guard Bldg.

Klamath Falls
Howard R. Perrin

Medford
William Laing, U. S. National Bank Bldg.

Portland
J. D. Annand, 1123 N.W. Glisan St.
Barrett & Logan, 1940 S.W. 4th Ave.
A. E. Doyle & Associates, Pacific Bldg.
C. N. Freeman, Postal Bldg.
Francis B. Jacobberger, McKay Bldg.
Hollis Johnston, Railway Exchange Bldg.
Jones and Marsh, Woodlark Bldg.
Lawrence & Allyn, Failing Bldg.
Truman E. Phillips, Pearson-Fourth Ave. Bldg.
Roald & Schneider, Spalding Bldg.
F. Marion Stokes, Terminal Sales Bldg.

Salem
Lyle P. Bartholemew, U. S. National Bank Bldg.

Pennsylvania

Allentown
H. F. Everett & Associates, Commonwealth Bldg.
Ruhe & Lange, 12 N. 6th St.
George E. Yundt, 16 S. 6th St.

Altoona
Hunter & Caldwell, 3601 Fifth Ave.

Bradford
Thomas K. Hendryx, Box 213

Charleroi
Alan C. Brenton, First National Bank Bldg.

Donora
C. C. & E. E. Compton, 4th St. and Thompson Ave.

Doylestown
A. Oscar Martin & Son, Hart Bldg.

Du Bois
Russell G. Howard, Deposit Bank Bldg

Erie
Clement S. Kirby, Commerce Bldg.
Meyers & Johnson, Commerce Bldg.
G. W. Stickle, Commerce Bldg.

Esterly
Elmer H. Adams

Greensburg
Sorber & Hoone, First National Bank Bldg.

Harrisburg
Lawrie & Green, 111 S. Front St.
James W. Minick, 503 N. Second St.
Joseph Lesher Steele, 219 Walnut St.

Hazleton
Harry B. Lentz, Traders Bank

Homestead
Adam G. Wickerham, 135 E. 8th Ave.

Johnstown
Horace A. Bailey, 209 Franklin St.
H. B. Raffensperger, Glessner Bldg.

Kittanning
Tillman Scheeren, Jr., Boarts Bldg.

Lancaster
Ross W. Singleton, Woolworth Bldg.

Lewisburg
Malcolm A. Clinger, 33 N. Second St.

McKeesport
Charles R. Moffitt, Masonic Temple Bldg.

Monessen
H. Ernest Clark, 725 Second St.

Mount Carmel
Henry J. Socoloskie, 310 S. Hickory St.

New Brighton
J. E. & A. L. Martsolf, 512 Third Ave.

New Castle
W. G. Eckles Co., Lawrence Savings & Trust Bldg.
The Thayer Co., Greer Bldg.

Norristown
Henry Gordon McMurtrie, Airy & Stanbridge Sts.

Oil City
Holmes Crosby, Beers Bldg.

Philadelphia
Horace W. Castor, Architects Bldg.
Henry D. Dagit & Sons, 1329 Race St.
Davis & Dunlap, 1717 Sansom St.
Thomas J. Earley, 1701 Walnut St.
Gondos & Gondos, Architects Bldg.
Frank E. Hahn, Inc., 1511 W. Oxford
Heacock & Platt, 152 N. 15th St.
Walter T. Karcher & Livingston Smith, 1520 Locust St.
The Office of Charles Z. Klauder, 1429 Walnut St.
W. H. Lee, 1505 Race St.
Lewis P. MacKenzie, Otis Bldg.
Sydney E. Martin, Architects Bldg.
G. W. Pepper, Jr., 1600 Walnut St.
Savery, Scheetz & Gilmour, 21 S. 12th St.
Howell Lewis Shay, Packard Bldg.
George Franklin Sook, 3338 W. Penn St.
Office of Horace Trumbauer, Julian F. Abele & William O. Frank, Land Title Bldg.
Wenner & Fink, 1701 Arch St.
Stanley Yocom, Board of Public Education, Parkway at 21st St.

Pittsburgh
Carlisle & Sharrer, Martin Bldg.
Press C. Dowler, Century Bldg.
Joseph Hoover, Keystone Bldg., Fourth Ave.
J. Lawrence Hopp, 400 Hazel Drive
Richard Irvin, 508 3rd Ave.
Kaiser, Neal & Reid, 324 Fourth Ave.
Leo A. McMullen, Renshaw Bldg.
Casimir J. Pellegrini, 201 S. Craig St.
John H. Phillips, Wabash Bldg.
Charles M. & Edward Stotz, Jr., Bessemer Bldg.

Pottsville
Philip G. Knobloch, 1811 W. Market St.

Reading
Wayne M. High & Sons, 230 N. Sixth St.
W. Marshall Hughes, 147 N. 5th St.
Muhlenberg, Yerkes & Muhlenberg, Ganster Bldg.
Ritcher & Eiler, 147 N. 5th St.

Sayre
Harry C. Child, 501-503 S. Keystone Ave.

Scranton
Coon & Barrett, Scranton National Bank Bldg.
Hancock & Willson, Mears Bldg.

State College
Dean E. Kennedy, Route 322

Stroudsburg
Rinker & Kiefer, First Stroudsburg National Bank Bldg.

Turtle Creek
Hunter & Caldwell, 614 Penn Ave.

Uniontown
Emil R. Johnson, 24 Robinson Ave.

Wilkes-Barre
Thos. A. Foster, Brooks Bldg.
Fred J. Mack, 22 N. Franklin St.
Austin L. Reilly, Bennett Bldg.

Wilkinsburg
Walter E. Schardt, 811 Pitt St.

Williamsport
R. Douglas Steele, 34 W. 4th St.

York
Office of John B. Hamme, 31 W. Market St.
Harry R. Lenker, Schmidt Bldg.

Rhode Island

Providence
Edward O. Ekman, 72 Weybosset St.
Albert Harkness, Industrial Trust Bldg.
B. G. V. Zetterstrom, 22 Delmar Ave.

Woonsocket
Walter F. Fontaine, Inc.

South Carolina

Anderson
Charles Wm. Fant, 109½ Sharpe St.

Bennettsville
H. D. Harrall, 717 W. Main St.

Charleston
David B. Hyer, Peoples Bldg.
Simons & Lapham, 7 State St.

Columbia
Heyward S. Singley, 1508 Washington St.
Wessinger & Johnson, Ritz Bldg.

Florence
Hopkins & Baker, Trust Bldg.

Greenville
Cunningham & Walker, 108 E. Washington St.
J. E. Sirrine & Co., 215 S. Main St.

Rock Hill
A. D. Gilchrist, 933 College Ave.

Spartanburg
Lockwood Greene Engineers, Inc.
W. Paul Williams, Box 383

South Dakota

Aberdeen
J. W. Henry, First National Bank Bldg.
Roland R. Wilcken, Citizens Bldg.

Mitchell
Walter J. Dixon, Medical Arts Bldg.

Rapid City
Adrian L. Forrette, Elks Bldg.

Sioux Falls
Hugill & Blatherwick, Boyce Greeley Bldg.
Perkins & McWayne, Paulton Bldg.
Harold Spitznagel, Western Surety Bldg.

Tennessee

Bristol
R. V. Arnold, 602 Shelby St.

Chattanooga
Selmon T. Franklin, 714 Lindsey St.
R. H. Hunt Co., James Bldg.
W. H. Sears & P. B. Shepherd, James Bldg.
Gordon L. Smith, Volunteer Bldg.

Clarksville
Speight & Hibbs

Johnson City
D. R. Beeson, Sells Bldg.

Kingsport
Allen N. Dryden, W. Market St.

Knoxville
Barber & McMurry, 517½ W. Church Ave.
Fred Manley Associates, Empire Bldg.

Memphis
George Awsumb, 1792 Forrest Ave.
Hanker & Heyer, Commerce Title Bldg.
Geo. Mahan, Sterick Bldg.
Estes W. Mann, Shrine Bldg.
Walter R. Nelson, 2115 Monroe Ave.
Regan & Weller, Commerce-Title Bldg.
Raymond B. Spencer, John R. Sanford, Associate, First National Bank Bldg.

Nashville
Dougherty & Clemmons, Third National Bank Bldg.
Thos. W. Gardner, Amer. Trust Bldg.
Hart, Freeland & Roberts, Third National Bank Bldg.
Hart & Russell, Third National Bank Bldg.
Hibbs, Parrent & Wheeler, American Trust Bldg.
Granbery Jackson, Jr., Vendome Bldg.
Marr & Holman, Stahlman Bldg.
McKissack & McKissack, Morris Memorial Bldg.
George D. Waller, Third National Bank Bldg.
Emmons H. Woolwine & John Harwood, American Trust Bldg.

Texas

Abilene
David S. Castle Co.
C. R. Gaskill, Jr., Alexander Bldg.

Amarillo
Macon O. Carder, Fisk Bldg.
Guy A. Carlander, Box 3158
Emmett F. Rittenberry & Son, Fisk Bldg.
Townes & Funk, 1208 W. 10th St.

Austin
Driscoll & Groos, 801 Park Place
Bubi Jessen & Wolf Jessen, 112 E. 9th St.
H. F. Kuehne, Littlefield Bldg.
C. H. Page & Son, Box 936
Page, Southerland & Page, Nalle Bldg. Annex
Shingle & Scott, Littlefield Bldg.
Roy L. Thomas, 2812 N. Guadalupe St.

Beaumont
Stone & Pitts, Goodhue Bldg.
N. E. Wiedemann, American National Bank

Brenham
Travis Broesche

Cameron
J. E. Johnson

Corpus Christi
Brock, Roberts & Anderson, Jones Bldg.
Hamon & Co., 715 S. Tancahua St.
Nat W. Hardy, Nixon Bldg.
Morris L. Levy, 1124 2nd St.
Ralph E. Scamell, 326 Cole St.

Corsicana
Blanding & Horn, Mays Bldg.

Dallas
Arthur A. Brown, 221 N. Edgefield
Ralph Bryan, Construction Bldg.
Eugene Davis, 3736 Purdue St.
Raymond S. Feinberg, 3913 Kenmore St.
Flint & Broad, Burt Bldg.
La Roche & Dahl, Southland Life Annex
C. H. Leinbach & Bro., Texas Bank Bldg.
Mark Lemmon, Tower Petroleum Bldg.
Maurice Peterman, 4303 Trellis Court
Arthur E. Thomas, Construction Bldg.

El Paso
F. W. Carroll, 2520 San Jose St.
Percy Wear McGhee, F. N. Bank Bldg.
Trost & Trost, El Paso National Bank Bldg.

Fort Worth
Adam A. Bliss, Flatiron Bldg.
W. G. Clarkson & Co., First National Bank Bldg.
Preston M. Geren, 806½ Burnett St.
C. M. Love & Co., 314 S. Henderson St.

Galveston
Ben Milam, U. S. Nat'l Bank Bldg.
R. R. Rapp, Guaranty Bldg.

Georgetown
L. L. Huie, Box 125

Henderson
J. L. Downing, First National Bank

Houston
Lamar Q. Cato, Junior League Bldg.
Cameron Fairchild, Houston Merchants Exchange Bldg.
Alfred C. Finn, Bankers Bldg.
Hedrick & Lindsley, Inc., Southern Standard Bldg.
Henry F. Jonas & Tabor, Union National Bank Bldg.
Joseph W. Northrop, Jr., 3940 Main St.
Harry D. Payne, 3908 Main St.
R. G. Schneider & Co., Inc., Republic Bldg.
Ernest L. Shult, 5009 Fannin St.
Henry Aam Stubee, 5009 Fannin St.
Maurice J. Sullivan, 3901 Travis St.
Wirtz, Calhoun & Willaver, 500 Stuart St.

Jasper
W. C. Meador, Box 603

Kilgore
Charles T. Freelove, Laird Bldg.

Laredo
Trout & Leyendecker, Valls Bldg.

Livingston
Emory S. White

Longview
N. L. Peters, Glover-Crim Bldg.

Lubbock
The Butler Co., 406 Ave. M
Haynes & Strange, Myrick Bldg.
O. R. Walker, Palace Theatre Bldg.

Lufkin
Kent & Coston

Palestine
T. Brook Dougherty, 201½ N. Spring St.
O. L. Hazelwood, Link Bldg.
Theo. S. Maffitt, 510 N. Sycamore St.

Paris
Will H. Lightfoot, Lamar & 21st St.
Edwin R. Smith, N. Main St.

San Angelo
Mauldin & Lovett, 521 W. Bureaugard St.

San Antonio
Adams & Adams, Gunter Bldg.
Leo M. J. Dielmann, 145 North St.
Jno. M. Marriott, Frost Bank Bldg.
Will N. Noonan, Builders Exchange Bldg.
Phelps & Dewees & Simmons, Majestic Bldg.
Harvey P. Smith, National Bank of Commerce Bldg.

Sweetwater
Don W. Smith, Doscher Bldg.

Texarkana
Horace H. Harner, 411 State Line Ave.

Tyler
Gregory & Cates, Gary Bldg.
Birch D. Easterwood & Son, 1316 Austin Ave.
Shirley Simons, 118 W. 4th St.

Wichita Falls
Voelcker & Dixon, Inc., 913½ Indiana St.

Utah

Logan
Karl C. Schaub & Son

Ogden
Leslie S. Hodgson, Eccles Bldg.

Provo
Claude Shepherd Ashworth, 44 W. 2nd St., N.
Joseph Nelson, 135 E. Center St.

Salt Lake City
Ashton & Evans, Beneficial Life Bldg.
Cannon & Mullen, Templeton Bldg.
Fetzer & Fetzer, Templeton Bldg.
Niels P. Larsen, 68 S. Main St.
Miles E. Miller, Felt Bldg.
Carl W. Scott, Dooly Bldg.
Lorenzo S. Young, Continental Bank Bldg.

Vermont

Burlington
Austin & Austin, 246 College St.
Freeman, French, Freeman, 138 Church St.

Virginia

Arlington
Mims, Speake & Company, 3150 Wilson Blvd.

Charlottesville
S. J. Makielski, Barracks Road

Lynchburg
Pendleton S. Clark, Krise Bldg.

Newport News
Williams, Coile & Pipino, Melson Bldg.

Norfolk
Rudolph, Cooke & Van Leeuwen, Arcade Bldg.

Richmond
Baskerville & Son, Central Bank Bldg.
Carneal, Johnston & Wright, Atlantic Life Bldg.
Raymond V. Long, State Dep't of Education
J. Binford Walford, 103 E. Cary St.
Marcellus Wright & Son, 1103 E. Main St.

Roanoke
Eubank & Caldwell, Inc., Boxley Bldg.
Randolph Frantz & John M. Thompson, Boxley Bldg.
Smithey & Boynton, 112 W. Kirk Ave.
Frank F. Stone, 110½ W. Church Ave.

Washington

Bellingham
F. Stanley Piper, Herald Bldg.

Bremerton
B. H. Branch, Wallace Bldg.

Longview
Ray V. Weatherby, Henry Bldg.

Pullman
Stanley A. Smith, State College of Washington

Seattle
Charles H. Bebb & John Paul Jones, Hoge Bldg.
Graham & Painter, Dexter Horton Bldg.

William Mallis, Lyon Bldg.
Earl W. Morrison, Textile Tower
Naramore & Brady, Dexter-Horton Bldg.
Fred B. Stephen, Smith Tower
James M. Taylor, Jr., Textile Tower
Arch N. Torbitt, 915 Spruce St.

Spokane
Henry C. Bertelsen, Empire State Bldg.
G. A. Pehrson, Old National Bank Bldg.
George M. Rasque & Son, Washington Trust Bank Bldg.
Rigg & Vantyne, Peyton Bldg.
Whitehouse & Price, Hutton Bldg.

Tacoma
E. J. Bresemann, Perkins Bldg.
Laurence P. Johnston, 711 N. First St.
Mock & Morrison, Perkins Bldg.
Chas. and Clarence Rueger, Puget Sound Bank Bldg.
Sutton, Whitney & Dugan, Rust Bldg.

Vancouver
D. W. Hilborn, 307 E. 10th St.
Donald J. Stewart, Central Bldg.

Yakima
John W. Maloney, Larson Bldg.
Walter H. Rothe, Liberty Bldg.

West Virginia

Bluefield
Garry & Sheffey, Appalachian Bldg.
Alex B. Manhood, Box 668

Charleston
Herbert S. Kyle, Union Trust Bldg.
Walter F. Martens, Chamber of Commerce Bldg.
Meanor & Handloser, Inc., Payne Bldg.—Lee St.
Tucker & Silling

Fairmont
L. D. Schmidt, Professional Bldg.

Huntington
Levi J. Dean, 2748 Guyan Ave.
Frampton & Bowers, 412 11th St.

Wellsburg
Ralph W. Whitehead Banking & Trust Bldg.

Wheeling
J. C. Burchinal
George B. Cunningham, McLain Bldg.
Frederick Faris, 1117 Chapline St.
Kenneth G. Paxton, Board Trade Bldg.

Wisconsin

Appleton
Raymond N. LeVee 203 E. College Ave.

Boscobel
Joseph G. Durrant

Eau Claire
Howard M. Nelson, S. A. F. Bldg.

Green Bay
Gordon Feldhausen, Gardner C. Coughlen, Columbus Bldg.
Foeller, Schober, Berners, Safford & Jahn, 310 Pine St.
Levi A. Geniesse, 226 N. Washington St.
Oppenhamer & Obel, 110 S. Washington St. (also in Wausau)

La Crosse
Boyum, Schubert & Sorenson, Hoeschler Bldg. (also in Winona, Minn.)
J. Mandor Matson, Exchange Bldg.
Parkinson & Dockendorff, Linker Bldg.

Madison
Beatty & Strang, 610 State St.
John J. Flad & Thomas H. Flad, Associates, 133 Langdon St.
Law, Law & Potter, 1 S. Pinckney St.
Lewis Siberz, 103 W. Mifflin St.
Starck & Schneider, Inc., S. S. Carroll St.
Edward Tough, 119 E. Washington Ave.

Manitowoc
Percy Brandt, 104 N. 8th St.

Marinette
Max Hanisch, Stephenson Block

Marshfield
Gus A. Krasin, 208 S. Central Ave.

Milwaukee
E. Brielmaier & Sons Co., First National Bank Bldg.
Brust & Brust, 135 W. Wells St.
Clas & Clas, Inc., 759 N. Milwaukee St.
Gerrit J. deGelleke, 152 W. Wisconsin Ave.
Ebling & Plunkett, 739 N. Broadway
Eschweiler & Eschweiler, 720 E. Mason St.
William G. Herbst, 1249 N. Franklin Pl.
Lindl, Schuette & Lefebvre, 709 N. 11th St.
Robert A. Messmer & Bro., 231 W. Wisconsin Ave.
William H. Mitterhausen, 2137 N. 55th St.
Alfred H. Siewert, 2309 N. 36th St.
Slaby & Keymar, 2925 N. 75th St.
Charles F. Smith, 739 N. Broadway
Roger A. Sutherland, 259 E. Wells St.
John Topzant 424 E. Wells St.
Herbert W. Tullgren, 1234 N. Prospect Ave.
Guy E. Wiley, 2213 N. 34th St.

Monroe
Stanley W. Howe, 1518 11th St.

Oshkosh
Auler, Jensen & Brown, E. R. A. Bldg.

Sheboygan
Edgar A. Stubenrauch, 708 Erie Ave.

Superior
Roland C. Buck, Inc., Telegram Bldg.

Two Rivers
Sylvester Schmitt, Bank Bldg.

Wausau
Oppenhamer & Obel, 610½ Third St. (also in Green Bay)

Wauwautosa
Mark F. Pfaller, 8525 Ravenswood Circle

Wisconsin Rapids
A. F. Billmeyer & Son, 172 2nd St.

Wyoming

Casper
Leon C. Goodrich, 504 S. McKinley St.

Cheyenne
Frederic H. Porter, 211 W. 19th St.

Alaska

Anchorage
N. Lester Troast & Associates

Hawaii

Honolulu
C. W. Dickey, Damon Bldg.
Guy N. Rothwell, Damon Bldg.
Hart Wood & Arthur J. Russell, 2512 Manoa Road.

Canada

Calgary, Alta.
W. A. Branton, Calgary School Board,

Montreal, Que.
Joseph Sawyer, Guy St., 1207

Ottawa, Ont.
Leblanc & Martineau, 100 George St.

Quebec, Que.
Amyot, Bouchard & Rinfret, 105 Mountain Hill
Pierre Levesque, 115 St. John St.

Sherbrooke, Que.
Louis N. Audet, 32 Wellington St., N.

Sudbury, Ont.
P. J. O'Gorman, Mackey Bldg.

Thetfordmines, Que.
J. Berchmans Gagnon, 326 Notre Dame St.

Toronto, Ont.
S. B. Coon & Son, 4 St. Thomas St.
Page & Steele, 20 St. Clair Ave., W.

Trois-Rivières, Que.
Ernest L. Denoncourt, 1425 Notre Dame St.

Vancouver, B. C.
Harold Cullerne, 325 Howe St.
Sharp & Thompson, Berwick & Pratt, 626 Pender St.

Wolfville, N. S.
Leslie R. Fairn, Main St.

MECHANICAL AND ELECTRICAL ENGINEERING CONSULTANTS

The following directory is restricted to Mechanical and Electrical Engineering Consultants who are in independent professional practice and have actually been identified with a number of university or school projects.

Space limitations permit only three listings for each individual or firm and preclude mentioning the name of the architect associated. The following abbreviations are used throughout: h (heating), v (ventilating), p (plumbing), ac (air conditioning), e (electrical), l (lighting), m (mechanical), pp (power plant).

CALIFORNIA

E. L. Ellingwood, 124 W. 4th St., Los Angeles
University of Arizona, Tucson (*h, v, ac, e, m, sewage disposal, water systems*)
University of Southern California, Los Angeles (*h, v, ac, e, m, sewage disposal, water systems*)
University of Redlands, Redlands (*h, v, ac, e, m, sewage disposal, water systems*)

Ralph E. Phillips, 816 W. Fifth St., Los Angeles
Allan Hancock Foundation for Biological Research, University of Southern California, Los Angeles (*h, v, p, e, ac*)
School of Architecture and Fine Arts, University of Southern California, Los Angeles (*h, v, p, e, ac*)
Doheny Memorial Library, University of Southern California, Los Angeles (*h, v, p, e, ac*)

Robt. M. Storms, 1717 N. Vine St., Los Angeles
Ruth Reid and Barbara Worth Elementary Schools, Brawley (*p, h, v*)
Elementary and High School Buildings, Trona (*p, h, v*)
Grove Avenue School, Clearwater (*p, and water supply*)

Thomas B. Hunter, 41 Sutter St., San Francisco
Hoover War Library, Stanford University (*h, v, ac, p, e*)
Administration, Medical, Physics, and Emergency Classroom Building, University of California at Berkeley (*h, v, ac, p, e*)
University of Nevada, Reno (*three buildings and power plant*)

Leland and Haley, 58 Sutter St., San Francisco
Bay Terrace Elementary School, Vallejo (*h, v, p*)
Steffan Manor Elementary School, Vallejo (*h, v, p*)
Junior High School, Vallejo (*h, v, p*)

G. M. Simonson, 625 Market St., San Francisco
Thomas Larkin School, Monterey (*e, h, v, p*)
Montclair School, Oakland (*e, h, v, p*)
Lakeview School, Oakland (*e, h, v, p*)

CONNECTICUT

Paul D. Bemis, 36 Pearl St., Hartford
Norwich Trade School, Norwich (*h, v, p, e*)
Ray Technical School, Moodus (*h, v, p, e*)
Cloonaan Junior High School, Stamford (*h, v, p, e*)

Paul D. Harrigan, 37 Whitney Ave., New Haven
North Haven High School, North Haven (*p, h, v*)
Stonybrook School, Stratford (*p, h, v*)
Edison School, Bridgeport (*p, h, v*)

Hubbard, Rickerd & Blakeley, 275 Orange St., New Haven (also at Boston, Mass.)
Library, Connecticut College for Women, New London (*p, h, ac, e*)
Williams Memorial School (Addition of Domestic Science Room), New London (*p, e*)
Westwood High School, Westwood, Mass. (*m*)

DELAWARE

Robert P. Schoenijahn, Industrial Trust Bldg., Wilmington
Service Building and Boiler Plant, University of Delaware, Newark (*h, v, p, e, ac, boilers and stoker installation*)
Men's Dormitory, University of Delaware, Newark (*p, h, v, e*)
Milford State School Addition, Milford (*p, h, v, e*)

DISTRICT OF COLUMBIA

M. F. Hoppe, 1021—20th St., N. W., Washington, D. C.
Takoma Park Junior High School Addition, Takoma Park, Md. (*h, v, p, e, ac*)
Washington Missionary College, Takoma Park, Md. (*pp, underground steam distribution, etc.*)
Franciscan Monastery, Washington, D. C. (*h, v, p, e, ac*)

Wm. K. Karsunky, 1223 Connecticut Ave., N. W., Washington, D. C.
Richard Montgomery High School, Rockville, Md. (*cafeteria and shop, h, p, e*)
Bradley Hills Elementary School, Bradley Hills, Md. (*h*)
Curley Hall, Catholic University of America, Washington, D. C. (*h, p, e*)

Weschler & Cleary, 732 17th St., N. W., Washington, D. C.
Trinity College Science Bldg., Washington, D. C. (*h, v, p, e*)
Kingsman School, Washington, D. C. (*h, v, p, e*)
Officers School, U. S. Marine Corps, Quantico, Va. (*h, v, p, e*)

FLORIDA

John C. Pastor, 1091 Talbot Ave., Jacksonville
Seabreeze High School, Board of Education, Volusia City, Daytona Beach (*m, p, h, v*)
San Jose High School, Board of Education, Duval County, Jacksonville (*m, p, h, v*)
Vocational School and Shop, Board of Education, Duval County, Jacksonville (*m, p, h, v, water system*)

Maurice H. Connell & Associates, Langford Bldg., Miami
Rollins College, Winter Park (*m, e, sewers and equipment*)
North Beach School, South Beach School, Miami Senior High School, Dade County (*m, e, and equipment*)

GEORGIA

Newcomb & Boyd, Trust Co. of Georgia Bldg., Atlanta
Classroom Bldg., University of Georgia, Athens (*h, v, p, e*)
Girls' Dormitory, Mercer University, Macon (*h, v, p, e*)
Auditorium, University of Georgia, Athens (*h, v, p, e*)

ILLINOIS

Irving E. Brooke, 189 W. Madison St., Chicago
Elgin Academy, Elgin (*h, p, v, wiring, refrig.*)
Central School, Harvard (*h, v, wiring*)
St. Procopius College Chemistry Bldg., Lisle (*h, p, v, wiring*)

Joseph L. Fatz, 5914 W. North Ave., Chicago
Washburne Trade School, Chicago (*h, v, p, power, dust collection*)
South Side Trade School, Chicago (*dust collection*)
Wilson Junior College, Chicago (*h, v, p, power, acoustics*)

Robert E. Hattis, Board of Trade Bldg., Chicago
Sterling Township High School, Sterling (*h, v, p, wiring*)
Arlington Heights South School, Arlington Heights (*h, v, p, wiring*)
Avoca School, Wilmette (*h, v, p, wiring*)

John Howatt, Board of Education, 228 N. LaSalle St., Chicago
Lane Technical High School (*h, v, p*)
South Side Vocational High School (*h, v, p*)
Oakenwald Elementary School (*h, v, p*)

George W. Hubbard, Railway Exchange Bldg., Chicago
Notre Dame High School, Chicago (*h, p, v*)
St. Leo's High School Addition, Chicago (*h, p, v*)
St. Mary of the Lake Seminary, Mundelein (*h, p, e, pp, etc.*)

A. C. King, 35 S. Dearborn St., Chicago
Lake Forest College, Lake Forest (*h*)

Samuel R. Lewis, 407 S. Dearborn St., Chicago
McKinley High School, Columbus, Ohio (*h, v, p, e*)
University of Illinois, Urbana (*h, v, ac*)
MacCumber High School, Toledo, Ohio (*h, v*)

Neiler, Rich & Co., 431 S. Dearborn St., Chicago
New Trier Township High School, Winnetka (*consultant on pp and all buildings*)
Northwestern University, Evanston and Chicago (*h, v, e, refrig., elevators, drinking water system, hot water piping*)
University of Chicago, Chicago (*h, v, p, e, ac, elevators, refrigeration*)

Beling Engineering Company, State Trust Bldg., Moline (also in Peoria)
High School, Washington (*h, v*)
High School, Atchison, (*h, p, e*)
High School, Paris, (*h, v*)

S. Alan Baird, Commercial National Bank Bldg., Peoria
Addition to Grade School, Rantoul (*h, v, p, e*)
Addition to Leyden Community High School, Franklin Park (*h, v, p, e*)
High School Building, Flanagan (*h, v, p, e*)

INDIANA

R. W. Noland, Medical Arts Bldg., Fort Wayne
Grade and High School, Berne (*h, v, p, e*)
German Township School, Bremen (*h, v, p, e*)
Boiler Plant, Huntington Public Schools (*entire project*)

Bevington-Williams, Inc., K. of P. Bldg., Indianapolis
School of Business, Indiana University, Bloomington (*h, v, p, e*)
Hall of Music, Indiana University, Bloomington (*h, v, ac, p, e*)
John H. Harrison Hall, DePauw University, Greencastle (*h, v, ac, p, e*)

J. M. Rotz Engineering Co., Merchants Bank Bldg., Indianapolis
Thomas Carr Howe High School, Indianapolis (*m*)
Indiana Boys' School, Plainfield (*m, power house remodeling, and service tunnel*)
Central Heating Plant and Washington Junior High School, Kokomo (*h, p, e*)

G. M. Williams, 333 N. Pennsylvania St., Indianapolis
Medical Building, Indiana University, Bloomington (*h, v, p, e*)
Physical Science Building, Indiana University, Bloomington (*h, v, p, e*)
Hall of Music, Indiana University, Bloomington (*h, v, p, e*)

IOWA

Everett M. Bartels, Independent School District, 629 Third St., Des Moines
Washington School (remodeling) (*h, v*)
West Junior High School (remodeling) (*h, v, p*)
Ft. Des Moines School (*h, v, sewage disposal*)

B. E. Landes, Hubbell Building, Des Moines
Agricultural Engineering Laboratory, Iowa State College, Ames (*h, v, p, e*)
Three Grade Schools, Ottumwa (*h, v, p, e*)
Women's Gymnasium, Iowa State College, Ames (*h, v, p, e*)

Meryl L. Todd, 1111 Independence Ave., Waterloo
High School and Gymnasium-Auditorium, Laurens (*h, v, p, pp*)
High School Gymnasium-Auditorium Addition, Webster City (*h, v, p*)
High School and Gymnasium-Auditorium, Harcourt (*h, v, p, pp*)

LOUISIANA

L. Villere Cressy & Lewis S. Alcus, 916 Union St., New Orleans
Pan American House, Louisiana State University, University (*p, h, e*)
Biloxi High School, Biloxi, Miss. (*p, h, e*)

MASSACHUSETTS

G. K. Saurwein, 247 Slade St., Belmont
Harvard Medical School Power Plant, Boston (*entire project*)
Harvard University, Cambridge (*fire protection, h, v, ac, e, steam distribution underground systems*)
New England Conservatory of Music, Boston (*automatic h control, pp problems*)

Hollis French, Office of, 210 South St., Boston
Auditorium, Rhode Island School of Design, Providence (*h, v, ac, p, l, pp*)
Groton School, Groton (*extensive underground steam distribution system*)
St. Mark's School, Southboro (*new sewage filter beds*)

Hubbard, Rickerd & Blakeley, 110 State St., Boston (also at New Haven, Conn.)
Westwood High School, Westwood (*h, v, p, e*)
High St. School, Medway (*h, v, p, e*)
School, Medway (*h, v, p, e*)

William A. McPherson, Department of School Buildings, 26 Norman St., Boston
F. V. Thompson School (*h, v*)
Airplane and Technical Shops, Boys' Trade Group (*h, v*)
Addition to Michael Perkins School (*h, v*)

MICHIGAN

J. N. Hadjisky, 744 Bates St., Birmingham
Michigan Normal College, Girls' Dormitory, Ypsilanti (*h, v, p*)
Barnum School, Birmingham (*swimming pool operation*)

Farrell & White, 409 Griswold St., Detroit
Ford Elementary School, Detroit (*m*)
Mumford High School, Detroit (*p, h, v, e*)
Addition to Wayne University, Detroit (*p, h, v, e*)

N. B. Hubbard, 220 Bagley Ave., Detroit
Addition, East Jordan (Mich.) High School (*h, p, e*)
Service Bldg., State School for Deaf, Flint (*h, p, e*)
Addition to Columbus School, Detroit (*h, p, v*)

Snyder & McLean, Penobscot Building, Detroit
High School, Alpena (*h, v, p, e, m*)
Dramatic Arts Building, Western State Teachers College, Kalamazoo (*h, v, p, e, stage equipment*)
Chemical Engineering Building, Michigan College of Mining Technology, Houghton (*h, v, p, e, m*)

Ray S. M. Wilde, 18286 Griggs St., Detroit
Cranbrook School for Boys, Bloomfield Hills (*m, e*)
Kingswood School for Girls, Bloomfield Hills (*m, e*)
Michigan Union Dormitory, Ann Arbor (*m, e*)

MINNESOTA

Charles Foster, Medical Arts Building, Duluth
Ondossagon Gym Addition, Ashland, Wisc. (*h, v, p, e*)
Remer School Addition, Remer (*h, v, p, e*)
State Teachers College, Duluth (*h, v, p, e*)

Ralph L. Bloom, Sexton Bldg., Minneapolis
Auditorium and Classroom Addition, High School, Osakis (*h, v, p, e*)
School Addition, Waite Park
Auditorium, Washington High School, Fergus Falls (*h, v, p, e*)

A. D. Martino, Metropolitan Life Bldg., Minneapolis
St. Mark's School, Shakopee (*p, h, e*)
Sisters of St. Francis School, Convent, and Chapel, Little Falls (*p, h, v, e*)
Resurrection School, Minneapolis (*p, h, v, e*)

G. M. Orr & Company, Farmers and Mechanics Bank, Minneapolis.
State Teachers College, Physical Education Building, Mankato
Central School, Rochester
Mound School, Mound

Rose & Harris, Essex Bldg., Minneapolis
Library Building, Macalester College, St. Paul (*h, v, p, e, sewer*)
Miller Vocational School, Minneapolis (*m*)
Library, St. Olaf College, Northfield (*m*)

A. L. Sanford, Empire Bank Building, St. Paul
Wallace Hall Dormitory, Macalester College, St. Paul (*h, v, p, e*)
High School, Bloomington (*h, v, p, e, t.c., boiler plant*)
Public Schools, Minneapolis (*h, v, p, e, t.c., elevators, pp*)

MISSOURI

Walter E. Gillham, 1207 Grand Ave., Kansas City
Buildings for the University of Arkansas, Fayetteville (*h, v, p, e*)
Home Economics Bldg., University of Nebraska, Lincoln (*m*)
Boys' Dormitory, Curtis, Nebr. (*m*)

John D. Falvey, 316 N. 8th St., St. Louis
Culver Military Academy, Culver, Ind. (*pp, m*)
Chemistry Building, Missouri School of Mines, University of Missouri, Rolla (*h, v, p, e*)
Lanphier High School, Springfield, Ill. (*h, v, e, p*)

Will D. Sampson & Associates, Ambassador Bldg., St. Louis
Six buildings, University of Texas, Austin (*h, v, p, e*)
Six buildings, Texas State College for Women, Denton (*m*)
East Texas Teachers College, Commerce

NEBRASKA

H. S. Seymour, World-Herald Bldg., Omaha
Religious Education Building, Dundee Presbyterian Church, Omaha (*h, v, p, e*)
Addition, Alta Vista Ward School, Cheyenne, Wyo. (*h, v, p, e*)
Women's Residence Hall, University of Wyoming, Laramie, Wyo. (*h, v, p, e*)

NEW JERSEY

Runyon & Carey, 33 Fulton St., Newark
Bloomfield (N. J.) Junior High School (*h, v, p, e*)
Katonah (N. Y.) Junior High School (*h, v, p, e*)
Connecticut Farms School, Union Township (*h, v, p, e*)

NEW YORK

George A. Teeling, 1 Columbia Place, Albany
Cayuga Union School, Cayuga (*sewage disposal system*)
Sillman Hall, Union College, Schenectady (*h, v*)
St. Patrick's School, Troy (*h*)

Thomas F. Dwyer, Board of Education, 49 Flatbush Ave. Ext., Brooklyn, N. Y.
Ft. Hamilton High School (*h, v, ac*)
Benjamin Franklin High School (*h, v, ac*)
Machine & Metal Trade High School (*h, v, ac, m*)

Beman & Candee, 374 Delaware Ave., Buffalo
Kenmore Senior High School, Kenmore (*h, v, p, e, swimming pool*)
Brocton Central Grade and High School, Brocton (*h, v, p, e, sanitation*)
Clark Memorial Gymnasium, University of Buffalo (*h, v, p, e, steam tunnel*)

Edward E. Ashley, 10 E. 40th St., New York
Library Extension, Sterling Hall of Medicine, Yale University, New Haven, Conn. (*p*)

Victor J. Cucci, 30 Church St., New York
Chapel, Skidmore College, Saratoga Springs (*h, v*)
Laboratory, St. Lawrence University, Canton (*p, sanitation*)
Science Building, Hampton Institute, Hampton, Va. (*h, v*)

Albert Fentzlaff, Inc., 11 W. 42nd St., New York
Suffern High School, Suffern (*p, h, v*)
Riverhead High School, Riverhead (*p, h, v*)
Great Neck High School, Great Neck (*p, h, v*)

Jaros, Baum & Bolles, 415 Lexington Ave., New York
Monroe Hall, Middlebury College, Middlebury, Vt. (*h, v, p*)
Gifford Hall, Middlebury College, Middlebury, Vt. (*h, v, p*)
St. Helena's Parish, Wilmington, Del. (*h, v, p*)

Krey and Hunt, 292 Madison Ave., New York
Brentwood School, Brentwood (*p, e, h, v*)
Mt. Vernon Seminary, Washington, D. C. (*p, h*)
Classroom Building, Clark College, Atlanta, Ga. (*e*)

William McClintock, 647 E. 232nd St., New York
Monroe High School, New York (*p and swimming pool*)
Public School 89, Brooklyn (*p, h, v*)
Public School 165, New York (*p*)

Alfred J. Offner, 139 East 53rd St., New York
Hotchkiss School, Lakeville, Conn. (*h, v*)
Lawrenceville School, Lawrenceville, Conn. (*h, v*)
New Canaan Country School, New Canaan, Conn. (*h, v*)

Slocum & Fuller, 18 E. 41st St., New York
Grover Cleveland Junior High School, Elizabeth, N. J. (*h, v, e, and sanitary work*)
Cranford High School, Cranford, N. J. (*h, v, e, and sanitary work*)
Center Street School, Norwalk, Conn. (*h, v, e, and sanitary work*)

Frank Sutton, 149 Broadway, New York
Gymnasium, Rutgers University, New Brunswick, N. J. (*h, v, e*)
Schermerhorn and Physics Building, John Jay Hall, Columbia University, New York (*h, v*)
Alfred University, Alfred (*boiler plant and controlled heating*)

Syska & Hennessy, 144 E. 39 St., New York
Cardinal Hayes Memorial High School for Boys, New York (*h, v, e, incinerators and sanitary work*)
University of North Carolina Chemistry Building, Chapel Hill (*h, v, p, e, elevators*)
Hillside High School, Hillside N. J. (*h, v, p, e*)

Paul Wunderlich, Grand Central Terminal Bldg., New York
Science Bldg., St. Patrick's School, Troy (*h, p, e, v*)
Shaler Hall and Fisher Museum, Wheaton College, Norton, Mass. (*h, p, e*)
Harvard Forest, Petersham, Mass. (*h, p, e*)

Stanley C. Stacy, Board of Education, 13 South Fitzhugh St., Rochester
John Marshall High School (*h, v, p, e*)
Edison Technical & Industrial High School (*h, v, p, e*)
Junior Vocational School (*h, v, p, e*)

Harold L. Alt, 115-27 225th St., St. Albans
North Side High School, Newark, N. J. (*h, ac, v*)
Shanghai American School, Shanghai, China (*h, p, boiler plant*)
Schenley High School, Pittsburgh, Penna. (*h, v, boiler plant*)

Cedric R. Acheson, Eckel Building, Syracuse
Clayton Central School, Clayton (*h, v, e*)
Addition to High School, Cortland (*h, v, e*)
Hadley-Luzerne Central School, Luzerne (*h, v, e*)

Irwin W. Whittemore, Cannon Place, Troy
Slingerlands Grade School, Delmar (*entire project*)
Thomas A. Knickerbocker Junior High School, Lansingburgh, Troy (*entire project*)

OHIO

Fosdick & Hilmer, Union Trust Bldg., Cincinnati
Classroom and Laboratory Building, Miami University, Oxford (*p, h, v, e*)
Men's and Women's Dormitories, Miami University, Oxford (*h, p, v, e, refrigerators, elevator*)
Holmes High School, Covington, Ky. (*h, v, p, e, boilers, stokers, breeching*)

A. M. Kinney, Inc., Enquirer Bldg., Cincinnati
Denison University, Granville (*pp, h, p, e*)
Lincoln Grant School, Covington, Ky (*m*)
Mount Washington School, Cincinnati (*m*)

O. W. Motz, 920 E. McMillan St., Cincinnati
Addition to Chemistry Building, University of Cincinnati (*h, v, temp. control, e*)
Addition to St. John's School, Cincinnati (*h, v, p, e*)
Our Lady of Lourdes School, Indianapolis (*h, v, p, e*)

Willard C. Pistler, Leverone Bldg., Cincinnati
Branch Hill School, Branch Hill (*h, v, p, e*)
Sixth District School, Covington, Ky. (*h, p, e, v*)
Boone County School, Burlington, Ky (*h*)

John Paul Jones, Cary & Millar, Terminal Tower, Cleveland
Physics Buildings, Oberlin College, Oberlin (*h, v, p, e*)
Hall Auditorium, Oberlin College, Oberlin (*h, v, p, e*)
Garfield School, Painesville (*h, v, p, e*)

OREGON

J. Donald Kroeker, Failing Bldg., Portland
Science Building, Williamette University, Salem (*h, v, p, pp*)
Sacred Heart Parish School, Oswego (*h, p*)
Warrenton High School, Warrenton (*h*)

Thomas E. Taylor, Postal Bldg., Portland
Alterations and Additions to 5 Schools, Pendleton (*h, v*)
Miscellaneous Additions, Portland (*h*)
Sunset Grade School, West Linn (*h, v*)

PENNSYLVANIA

Harry B. Joyce, Commerce Building, Erie
Lakewood School, West Millcreek (*h, v, p, e*)
State Teachers College Auditorium Building, Edinboro (*h, v, e*)
State Teachers College, Slippery Rock (*pp*)

Chas. A. Blatchley, Drexel Bldg., Philadelphia
Memorial High School, Arlington, Vt. (*h, v, p, e*)
Junior High School, Upper Darby Township, Delaware Co. (*m, e*)
North-West Junior High School, Reading (*m, e*)

Harry J. Eggly, Jr., Architects Bldg., Philadelphia
Technical Division, Senior High School, Lower Merion School District, Ardmore (*p, h, v, boiler house*)
Junior High School, Bristol Township, Bucks Co. (*h, v*)
Library Bldg., University of Maine, Orono (*p, h, ac*)

Louis T. Klauder and Associates, Lincoln Liberty Bldg., Philadelphia
Frick Chemical Laboratory, Princeton University, Princeton, N. J. (*h, v, p, e*)
Student Alumnae Bldg., Wilson College, Chambersburg (*m, e*)
Dormitory, Wellesley College, Wellesley, Mass. (*m, e*)

Charles S. Leopold, 213 S. Broad St., Philadelphia
Temple University, Unit No. 2 (*h, v*)
Grade School, Reading (*p, h, v, e*)
Joint University Library, Vanderbilt, Scarritt, and Peabody Universities, Nashville, Tenn. (*ac, p*)

Moody & Hutchison, Architects Bldg., Philadelphia
Laboratory Bldg., University of Pennsylvania, Philadelphia (*h, v, p, e*)
Two Dormitories, U. S. Naval Academy, Annapolis (*h, v, p, e, elevators*)
Laundry Bldg., U. S. Military Academy, West Point, N. Y. (*h, v, p, e*)

Pennell and Wiltberger, Broad and Chestnut Sts., Philadelphia
Northeast Catholic High School for Girls, Philadelphia (*h, p, e*)
Bell Avenue School, Yeadon (*p*)
Bloomsburg State Teachers College, Bloomsburg (*m, including pp*)

George W. Powell, Jr., 112 S. 16th St., Philadelphia
Chester (Pa.) Vocational School (*e*)
Garretford Public School, Upper Darby Township, Delaware Co. (*p, h, v, e*)
Willistown Elementary School, Willistown Township, Chester Co. (*p, h, v, e*)

Arthur McGonagle, Fulton Bldg., Pittsburgh
Mellon Institute, Pittsburgh (*h, v, m, laboratory equipment*)
Allegheny College, Meadville (*central steam plant*)
Ambridge High School, Ambridge (*h, v*)

Elwood S. Tower, Investment Bldg., Pittsburgh
Addition, Wellsville (Ohio) Vocational School (*h, v, p, e*)
National School, Treviskyn (*h, v*)
Neville Township School, Neville Island (*remodeling h, v*)

RHODE ISLAND

John J. McCarthy, Providence Public School Department, 20 Summer St., Providence
Hope High School (*h, v*)
Mount Pleasant High School (*h, v*)
Nathanael Greene Junior High School (*h, v*)

TEXAS

R. K. Werner, W. T. Waggoner Bldg., Fort Worth
Additions to Dunbar, Travis, Houston, Barber Elementary Schools and to High School, Mineral Wells (*m, e*)
Senior High School, Mineral Wells (*m, e*)
Journalism Bldg., Texas State College for Women, Denton (*m, e*)

Dale S. Cooper, 216 E. Cowan St., Houston
St. Agnes School for Girls, Houston (*m, e, h, v*)
High School, Luling (*h, v*)

VIRGINIA

Wiley & Wilson, Peoples Bank Bldg., Lynchburg
High School, Charlottesville (*h, v*)
Colored Elementary School, Lynchburg (*h, v*)
Gymnasium, University of North Carolina, Chapel Hill (*h, v*)

WASHINGTON

Lincoln Bouillon, 1411 Fourth Ave. Building, Seattle
J. M. Perry Institute of Trades, Industries, Agriculture, Yakima (*m, e*)
The Dalles High School, The Dalles (*h, v, p, e*)
Campus Elementary School, Western Washington College of Education, Bellingham (*h, v, p, e*)

Griffin & Lowe, Lloyd Bldg., Seattle
School, Bellevue (*h, v, p, e*)
School, Port Orchard (*h, v, p, e*)

C. W. May, Smith Tower, Seattle
Wallace School, Kelso (*h, v, p, e, ac*)
College of Puget Sound Women's Dormitory, Tacoma (*h, v, p, e, ac*)
Chemistry and Science Building, Washington State College, Pullman (*h, v, p, e, ac*)

Erwin L. Weber, Medical Arts Bldg., Seattle
Grade School, Silverdale (*h, v, p, e, ac*)
Navy Yard City and Lulu Haddon Schools, Bremerton (*h, v, p, e, ac*)
Shops, High School, Clover Park (*h, v, ac, p, e*)

C. G. Zokelt, 3810 24th Ave. South, Seattle
Anchorage Grade School and High School Additions, Anchorage, Alaska (*h, v, p, e*)
Longview Grade and High School Additions, Longview (*h, v, p*)
Mount Vernon Grade School, Mount Vernon (*h, v*)

WISCONSIN

G. L. Larson, 1213 Sweetbriar Road, Madison
Biochemistry Building, University of Wisconsin, Madison (*h, v, ac*)
Adams, Roosevelt and Washington Schools, Janesville (*h, v*)
Lapham and Marquette Schools, Madison (*h, v*)

CANADA

Walter J. Armstrong, 1010 St. Catherine St., W., Montreal, P. Q.
Alterations and Additions to Trinity College, Toronto University, Toronto, Ont. (*h, v, p, e*)
Stanstead College, Stanstead, Que. (*h, v, p, e*)
Gymnasium, Ridley College, St. Catherines, Ont. (*h, v, p, e*)

SECTION IV
OPERATION AND MAINTENANCE

EXPERIENCE GAINED IN MAINTENANCE AS A GUIDE TO SOUND CONSTRUCTION

By M. M. STEEN

Superintendent of Buildings and Architect, The Board of Public Education, Pittsburgh, Pa.

BUILDINGS, like people, grow old and decrepit and finally outlive their usefulness, either because of physical inability to function or because they are not flexible enough to be adaptable to changing conditions of use. Few building owners, however, ever think about subjecting their structures to systematic check-ups, and recognize deterioration only when conditions become so bad that the occupants are aware of the damage either by stumbling upon it or because of personal discomfort.

Periodical Inspections

In maintaining and operating a plant of approximately 150 buildings, we became aware of this kind of neglect and, many years ago, instituted a policy calling for periodical inspections. Our procedure is to make a complete examination of each structure every five years. The inspections are made by a qualified structural engineer, an architect, and a clerk who enters up the findings of the investigators on a form provided for the purpose.

At the time we started our inspections, I feel sure, our buildings had never before undergone such a careful, systematic scrutiny. The first work of this kind took us a little over a year to complete. After the field work was done, we prepared reports setting forth the condition of each building, with recommendations covering necessary repairs set up on a five-year forecast. As a result of the inspection, sixteen roof structures were strengthened where they showed symptoms of distress, many badly rusted structural steel members were replaced, and countless other less disturbing indications of decay were remedied. Along with the inspection reports, we bound-in key plans of each building and a form upon which all repair and maintenance work items were entered, along with the date of the work's accomplishment and the cost. This kind of record when properly kept up is a source of information of tremendous value to a busy administrator, and when kept close at hand enables him to answer practically any question which arises as to the physical condition of the plant.

The original purpose of such an inspection was to assure ourselves that no dangerous or unsafe condition would exist in our buildings, and, further, that incipient decay could be halted, with resultant economy, which is always the case when the proverbial stitch in time is employed. We soon discovered, however, that the work was productive of other results of equal importance. Our budget-making was greatly facilitated, and we became acutely conscious of good and bad types of construction, as well as of materials which performed well and those which failed when subjected to the test of time. Here was a golden opportunity to observe in traveling, day after day, through buildings ranging from those ninety years of age to those but recently completed. The weaknesses and strength of three generations of builders were brought to light. Many lessons were learned by observing weaknesses that kept appearing over and over again. In such cases more diligent search was made to discover the fundamental causes of the defects. Some such fundamental difficulties were found, and since we design and construct our own buildings, the findings have been applied to our practice with some measure of success.

It is in no way disparaging to say that architects, generally speaking, do not possess such experience. Their work is, for the most part, designing new buildings, not maintaining old ones, and, on the other hand, most maintenance men are not architects.

Ministering to sick buildings is perhaps as engrossing an occupation to the experienced designer and builder as ministering to sick people is to the M.D. There is a challenge in it which calls for close observation in diagnosing symptoms, and the employment of common sense in effecting cures. In many cases our search has been slow and failures have been discouraging, but we feel that some proper remedial measures have been found that are worth while. It

is the principal purpose of this paper to discuss a few such items—not magic cure-alls, but experience set forth as clearly as possible and passed on for what it may be worth.

The following list enumerates a few items which have caused us grief. Space will not permit a discussion of all of them, but we shall discuss some that we think are most common and cause widespread trouble and expense:

1. Parapet wall deterioration
2. Hung ceiling construction
3. Window and door lintel construction
4. Masonry construction and correction for leaky walls
5. Treatment of wood floors
6. Eliminating sound transmission
7. Policy to control painting contracts
8. Lengthening the life of paint coats on exterior metal

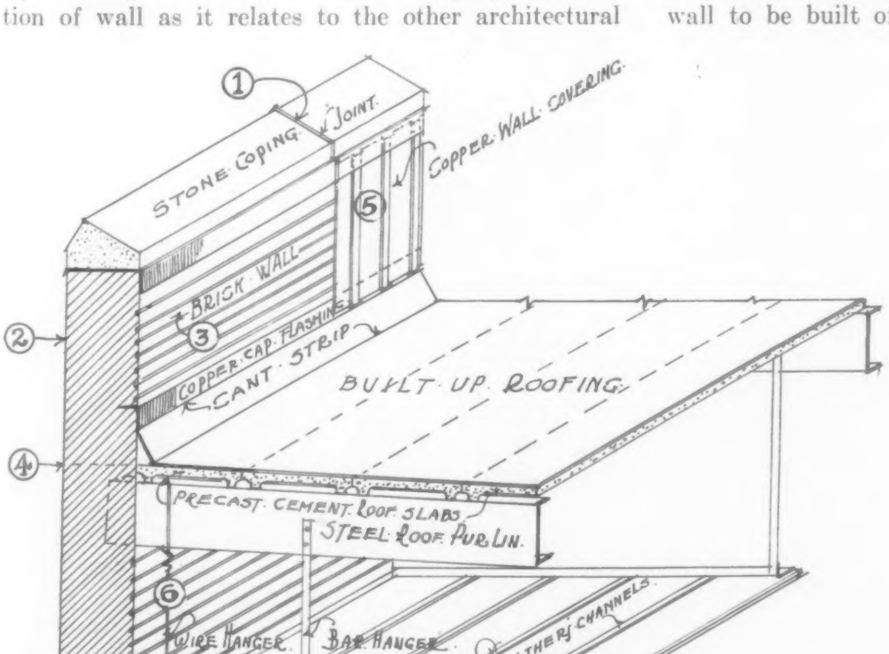
Parapet Wall Deterioration

Parapet walls are among the most prolific sources of trouble for the maintenance department. The causes of deterioration are many, and the cost of correction is great. If this be true, why not discard parapets and save all the trouble and expense? We might almost as well say: If we have chronic pains in the foot, why bother with it? Why not cut off the offending member? All this leads to a discussion of the question: "What is the function of the parapet wall?"

The first reason for parapets is one of pure esthetics. By building such walls, we obtain the proper proportion of wall as it relates to the other architectural features of the façade. If this were the only reason for parapets, some architects might be stampeded into the drastic operation of amputation, but there are other reasons probably more important. These walls serve as fire-walls and in some places are a legal requirement. They serve in other places as a barricade or railing and must be retained as a matter of safety. They serve as a natural abutment for what otherwise might be unsightly roof terminations. They contribute to the application of modernism in architectural treatment.

If we agree that parapets are a necessary evil, let us then examine their history, note their weaknesses and the causes for such weaknesses and, finally, suggest a cure or cures for them.

Parapet walls have failed principally because water got into the wall structure in one place or another and in winter froze and disrupted the wall, usually causing deterioration of the bonding of the mortar, and in some cases forced the wall out of the perpendicular to a position where eventually its stability was endangered and the walls had to be rebuilt. Before the days of through-wall flashing, the water entered the wall at the joints in the coping noted as No. 1 on Sketch No. 1. The correction for this was the employment of through-wall flashing. Water entered also at points (2) and (3). At point (3) a worse condition originally existed than at point (2), for the reason that architects, in attempting economy, specified the rear wall to be built of cheap, inferior brick because it



Sketch No. 1—High parapet. Protection of rear wall, adequate flashing, hung ceiling construction, etc., is indicated at numbered points

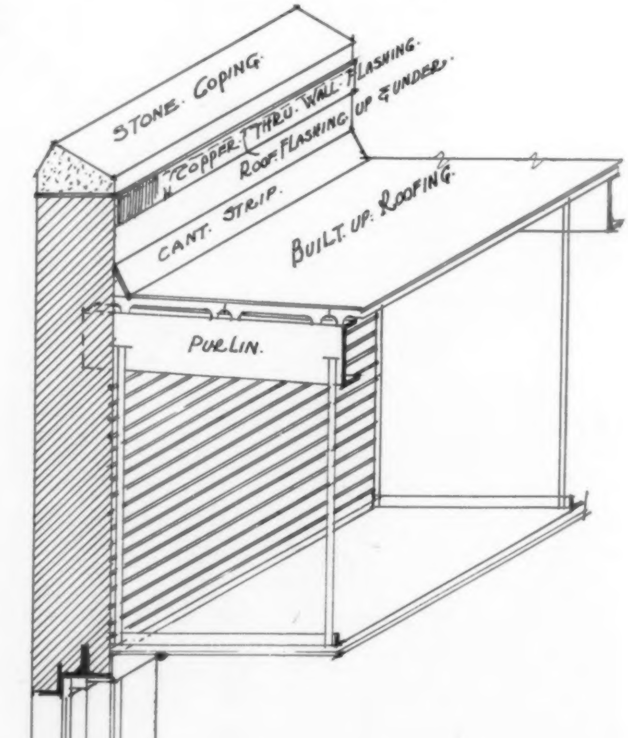
could not be seen and so did not matter. Our early attempts to correct the rear of the wall by applying waterproofing over the surface met with dismal failure. What happened was that water still found its way into the wall from the front and, being imprisoned, froze and broke through the waterproofing. In the spring, on visiting the jobs, we were surprised to find pieces of brick spalled out of the wall and lying scattered over the roof. As a corrective measure, we next applied vertical copper flashing over the back wall in such a manner as to allow an air space behind the flashing. The vertical flashing was placed up and under the turned-down apron of the through-wall flashing, under the coping, and down and over the turned-up roofing flashing placed over the cant strip, all as shown at point (5).

We now had arrived at a point that bade fair to solve our troubles to a great degree, but unfortunately trouble was discovered from another source. In buildings of considerable length we noticed that the end walls were being fractured by a very apparent lateral push of the parapet. This caused not only cracking at the corners of the building but a cracking at point (4) on the sketch. The tearing or cracking was due to the expansion and contraction of the wall horizontally and was caused by the great differences in temperature to which the wall was subjected, namely, temperatures below zero in winter and over 100 degrees in summer, while the rest of the building wall, protected by the building proper, maintained temperatures fluctuating between 50 and 90 degrees. In this case correction seemed more difficult, but we found it could be accomplished by building up a false rear-wall section and cutting holes in the roof structure to permit tempered air from the heated portion of the building to play upon the wall. Conversely, in summer weather this acts as an insulating factor against excessive heat, if properly constructed.

All that has been said so far has had to do with correcting old parapet walls improperly built. In considering new construction, we recommend that the roof structure be raised as indicated in Sketch No. 2. Immediately we hear a rumble of objection based principally upon a fear that since we are increasing cubage very materially, we shall necessarily increase cost in proportion, but let us see just what does happen to cost. The wall which supports the roof is already built and paid for, and at the line of corridor walls we must either stub-up columns a little or extend walls if the structure is entirely wall-bearing, but other than this the costs are practically the same.

The fact that the increased cubage does not affect cost materially is an indication of the general fallacy or unreliable nature, of envelope cubage. By envelope cubage is meant the cubage of a building obtained by using outside dimensions for length and breadth, and height as the dimension measured from a point one foot below the lowest floor level to either the roof level on flat roofs or the mean level of sloping roofs. In flat-roof buildings, parapets are figured and included in the cubage. Much can be said about cubical content of buildings, in fact, too much to indulge in a complete discussion of the subject here, but since the subject has been necessarily introduced because of the foregoing analysis of parapet troubles, I should like to add that for our purposes we have developed and use a type of cubage which we call "usable cubage." This is the total of the actual air content of all spaces in any way usable in a building. This type of cubage is a far more constant factor than envelope cubage, and when unit prices have been developed for this cubage much more reliable estimates of cost can be forecast.

Before leaving the subject of parapet walls, we should like to say a word about waterproofing the front face of the parapet. In an attempt to stop wall leakage, these walls—as, in fact, the face of all exterior walls—are sometimes waterproofed. Since the walls, whether they be constructed of stone or brick, must not be marred, a transparent colorless waterproofing is used. We wish to sound a word of warning in regard to this practice. No doubt there are some satisfactory waterproofing materials of this kind, but great care must be exercised in choosing



Sketch No. 2—Low parapet. Note the reduced amount of flashing. No rear wall is unprotected.

such a material. In addition to our own experience, numerous instances have come to our attention where walls so waterproofed looked perfectly satisfactory for a while, but after weathering took on an appearance which greatly marred the buildings. Most wall leakage occurs at the mortar joints and not through the masonry units, although some stone and brick have a high degree of absorption. In new structures this can be guarded against by the proper mortar mix. That subject really deserves a chapter or article to itself. In old structures we have found that the best way to cure leakages through mortar joints is to rake the joint out at least an inch in depth and point with proper mortar. This operation is expensive, and if the original mortar was high in cement content, it is also difficult. In such cases we have painted the mortar joint only, with a tried and approved colorless waterproofing.

Hung Ceiling Construction

Plastering work in general is deserving of considerable attention, not only in analyzing its behavior in existing buildings, but also in specifying it for new buildings in such a way as to obviate costly maintenance.

It is discouraging, in commenting on this subject, to realize the necessity for brevity. We should like to discuss the various kinds of plaster and when and how they should be used; the various kinds of metal lath; the steel stud partition; the introduction of coloring materials in the plaster mix, etc., but this article is intended merely to point out some of the most common faults we have encountered and to suggest remedies. For that reason we have chosen to discuss hung ceiling construction.

Hung ceilings are used in places where the story height desired is less than the general structure of the building provides. In most cases this occurs in the top story. Hung ceilings are just what the name implies—a ceiling which is hung from a supporting structure and exists at a location considerably below the supporting structure. These ceilings are not to be confused with the furred ceiling, which is generally a ceiling of plaster on metal lath constructed directly under the floor or roof construction but separated from it by furring blocks, pencil rods or some similar members used as separators.

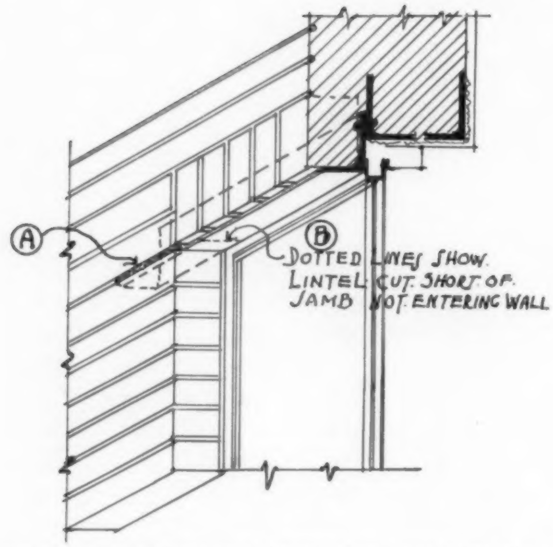
Hung ceilings are constructed as follows:

Structural steel angles, tees or channels or pressed steel members are hung from the supporting floor or roof construction, usually on approximately 4-foot centers; to these are tied up lathers' channels running in the opposite direction. The metal lath is then wired up to the lathers' channels. Upon this framework the plaster is then applied. In our inspection of hundreds of schoolrooms with hung ceilings, we noted as a general condition that cracks had occurred at the ends of the room at the junction of the walls and ceiling. This was so general that we decided some fundamental error in construction must exist. On investigation, we found in practically all such cases that the runner bars were hung to the supporting structure with wire as shown at (6), Sketch No. 1. The wire is tied to the point of support, brought down and looped around the runner bar, after which it is given a twist. Now the load represented by a hung ceiling in a standard classroom 22 x 32 feet is approximately 2 tons, and the weight hanging to the wires before mentioned has a tendency to stretch the ties. This lets the ceiling sag, and since the curve line which results is longer than a straight line, the plaster must crack. To overcome this tendency, we specify flat bars 1 x $\frac{3}{16}$-inch for hangers in place of wire. The bars are bolted to the carrying beams and the runner bars, and eliminate sagging. (See Sketch No. 1.)

Another point worth mentioning here is the common practice of turning down a strip of metal lath at the junction of masonry walls and the hung ceiling, the idea being that the lath will stop cracking at the junction point mentioned. Our experience is that the strip does not stop cracking, and that in many cases it transfers the action down the wall, resulting in a tearing action at the bottom of the strip of lath which is more disfiguring than the crack at the point of juncture. As a result of this experience, we do not call for the bridging strip of lath between walls and ceiling, but specify that the lather shall butt the hung ceiling against the walls, and the plasterer shall deliberately cut through the plaster coats at this point with his trowel, so that any cracking which may occur will be invited at that point and be as little obvious as possible; in fact, it is rarely enough to be unsightly or objectionable.

Many more things of a highly technical nature could be mentionel here, but we will content ourselves with two more general observations. First—require the plasterer to bring his second coat or brown coat to a true line so that it meets a 10-foot straight edge. Carelessness in keeping the ground coat true to line results in applying what is called a darby coat before skimming with the finish coat. Later, this causes the finish putty coat, which is very thin, to separate from the under coats. This often happens long after the completion of the buildings and even after the walls have been painted and washed several times.

Lastly, let me warn against letting the painting of plaster walls go too long before repainting, on the theory that, unlike exterior painting, interior painting is done principally for esthetic reasons and not as a protection. If plaster walls, both painted and unpainted, are examined carefully, it will be noted that they are more or less honeycombed with small hair-



Sketch No. 3—Window lintel construction. (A) Indicates point at which leakage may trickle in; (B), short lintel supporting brick head recommended for elimination of difficulty at joint (A)

line cracks. When this is the case, repeated washings not only wear the paint coat off, but actually allow the water to find its way through the small cracks and eventually divorce the skim coat from the under coat. The result is the falling-off of the skim coat, and much plaster patching.

Door and Lintel Construction

Although wall leakage in brick-faced buildings is usually caused by improper mortar mixes, slipshod methods of bricklaying, or leakage at horizontal projecting features, another source, not so well known and recognized, occurs at the heads of doors and windows and is the result of faulty lintel construction.

Sketch No. 3 shows a typical detail for a window lintel. In this case a steel angle of proper size spans the window opening and rests at either side upon the brick jambs forming the window opening. It will be noted that the thickness of the angle just about fills the space necessary for the mortar joint, and since the front tip of the angle is only about ½-inch back of the wall face, the mortar joint for the distance of the bearing of the lintel can only be mortar pointing (see A). This pointing often breaks loose and falls out; first, because it does not have enough body to stabilize it, and, second, because water draining across the lintel seat finds its way back of the pointing. In cold climates the water freezes and forces the pointing out. The reason the water sometimes drains along the lintel is that the mason carelessly sets the lintel so that it pitches toward the rear. In laying the brick upon the lintel and maintaining the bond with the wall proper, very little mortar can be placed on the lintel seat. Driving rain forces the water back along this imperfect joint, and when the angle is not set squarely, the water runs to either side, finally reaching the vulnerable spot at the jamb, where it finally gets into the jamb structure. If the pointing is out at the point of bearing and the vertical joints of the masonry have not been slushed full, excessive leakage trickles in and finds its way down the inside of the jamb. I have seen the inside plaster jambs throughout a building so badly affected by this fault that the plaster crumbled and much of the plaster jambs and parts of the wall had to be re-plastered.

In order to eliminate this difficulty, a detail as shown at (B) is recommended. In this case the front angle carrying the face brick at the head is cut short of the jambs by about ½-inch (see B). It is readily seen that at joint (A) no interruption of the regular brick joint occurs, and if any water gets back into the lintel seat and runs across it to the ends, it drips harmlessly outside the walls. In this method of linteling, the front angle is riveted to the back angle, which is either bolted or riveted to the steel in steel-frame construction or solidly fastened to the concrete or other masonry in wall-bearing masonry construction.

COMBATING TERMITES IN SCHOOL AND COLLEGE BUILDINGS

By A. C. HORNER

Consulting Engineer, San Francisco, Calif.

While there are three "habit groups" of termites, namely, subterranean, dry-wood, and damp-wood, the subterranean type is the one which causes the most damage in the United States. Damage to school buildings by the dry-wood and the damp-wood types of termites is practically negligible; therefore, the subterranean type of termite is the only one which will be discussed in this article.[1]

In considering methods of preventing damage by subterranean termites, the most important thing to be kept in mind is the fact that these termites normally live in the ground and attack wood or other cellulose products only for the purpose of obtaining food. These termites must have access to an adequate supply of moisture, which is seldom found in the wood they attack, and therefore the easiest way of preventing damage to wood structures is to insulate wood from the ground.

[1] Information on this subject, as well as general information on the entire subject of termite damage, may be found in the publication, "Termites and Termite Control," prepared by an editorial board and submitted as a report to the Termite Investigations Committee in 1934. This book is published by the University of California Press at Berkeley, Calif.

The problem of combating termites may readily be discussed under three headings:

1. New buildings
2. Buildings already erected and not yet infested with termites
3. Buildings already erected which have been damaged by termites

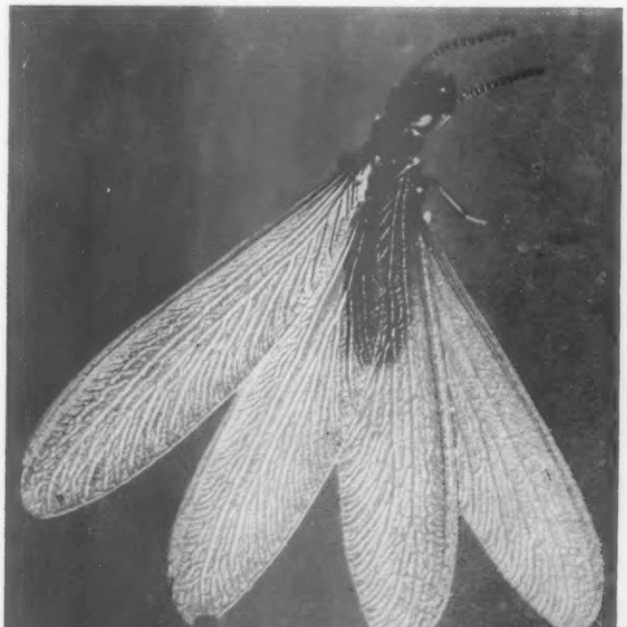
The problem of protecting new buildings from damage by termites is relatively simple and inexpensive. The protection of buildings already erected may or may not be simple, but it will usually be more expensive than the protection of new buildings. Repair of damage already done by termites and protection against further damage to existing buildings is the toughest and most expensive problem.

New Buildings

In most localities, it is relatively simple to protect new buildings. By running the customary masonry foundations some 12 or 18 inches above the adjacent ground level, most new wood frame buildings, or parts

Courtesy of the U. S. Department of Agriculture

The "worker" of the subterranean type of termite, Reticulitermes



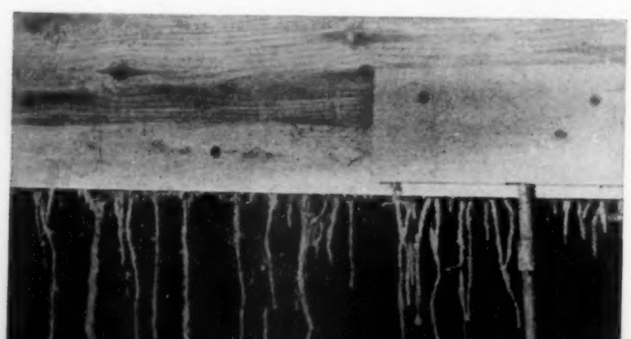
Courtesy of the U. S. Department of Agriculture

The winged reproductive, or alate, of the subterranean type, of Reticulitermes flavipes

thereof, can be adequately protected from subterranean termite damage. Good housekeeping, in the way of removing concrete form boards from the walls or piers of the building and keeping scraps of lumber and other cellulose products out from under the building, also helps materially.

Adequate ventilation of the space below the first floor of the building is important, too. For frame buildings a minimum of 2 square feet of air space is necessary for each 25 lineal feet of foundation wall. Cross-ventilation in the direction of the prevailing winds is particularly effective. Be sure that vents are so placed that dead air pockets do not exist. When wood-framed vents are used, see that the frame of the vent is not in contact with the ground. Vent screens should occasionally be cleared of spider webs and débris, which collect dirt and restrict air currents. Shrubbery should be so placed and maintained that it will not restrict air circulation through vent openings.

Another method of insulating wood from the ground, and one which has had marked success in tropical countries where the depredations of termites are severe, is by the use of metal termite shields. These are simply sheets of rust-resisting metal, laid over the top of masonry foundations, extended at least 2 inches beyond the edges of the foundation and bent down an additional 2 inches at an angle of 45 degrees, so as to prevent the termite from building mud tubes around the shield in order to get to the wood above. To be effective the shields must be properly manufactured and installed. In order to be sure that termite shields will do an adequate job, it is necessary that an unbroken surface be provided. This means that all joints must be so made as to eliminate the possibility of opening up because of temperature or mechanical injury. Any holes through the shields, such as bolt holes or openings for pipes, should be properly sealed to access by termites. Most of the termite shield installations so far observed by the writer in this country fail to fulfill some or all of these requirements and consequently are largely a waste of money.



Courtesy of the U. S. Department of Agriculture

Girders and joists, under the first floor of a school building, attacked by the subterranean termite Reticulitermes flavipes, Kol. Basement area was inadequately ventilated; form boards (not shown in picture) were left around the concrete piers; soil level was too close to girders

Sketch—Types of construction, inviting attack by termites, illustrated in sketch of hypothetical building (opposite page)

A. By wood in contact with ground
- (1) Foundation wall too low, permitting wood framing members to come in contact with ground.
- (2) Wood mudsill and wood joists in contact with ground.
- (3) Properly constructed intermediate concrete pier, improperly maintained. Soil has been thrown against one side of pier and is in contact with wood footing block resting thereon.
- (4) Improperly constructed intermediate concrete pier. Top of concrete pier is below surface of ground.
- (5) Wood framing members in contact with earth fill under concrete porch. Concrete foundation wall should have been carried up to top of concrete porch slab.
- (6) Exterior wood porch and steps in contact with ground.
- (7) Fuel wood, scraps left from construction of building, and casual wood of any kind attract termites.
- (8) Post extending through concrete floor to ground below.
- (9) Exterior wood siding in contact with ground.
- (10) Wood frame around foundation vents is in contact with ground.
- (11) Form boards, used in placing concrete, have been left in contact with ground.

B. By improper construction of foundation.
- (12) Solid brick foundation wall and veneer, with lime mortar joints which permit entry of termites through joints. See also (1), (2), (3), and (4) above.

C. By improper construction of porch
- See (5) and (6) above.

D. By improper or inadequate ventilation
- (13) Vent too small for area to be ventilated. Vent is also improperly placed for cross-ventilation.
- (14) Ventilation interrupted by dense shrubbery in front of vent opening. See also (10) above.

E. By improper drainage or excess of moisture
- (15) Improper maintenance of refrigerator drain. Water accumulating under house attracts termites. Drain should be led to outside of building.
- (16) Improper maintenance of roof drain pipes. Water should be led away from building.
- (17) Excessive watering of shrubbery or planting areas attracts termites.

F. By improper construction on the exterior wall
- (18) Stucco not properly bonded to concrete foundation wall permits hidden entry of termites to framework of building. See also (9) and (12) above.

G. By scrap wood, form lumber and other debris left beneath the house. See (7) and (11) above.

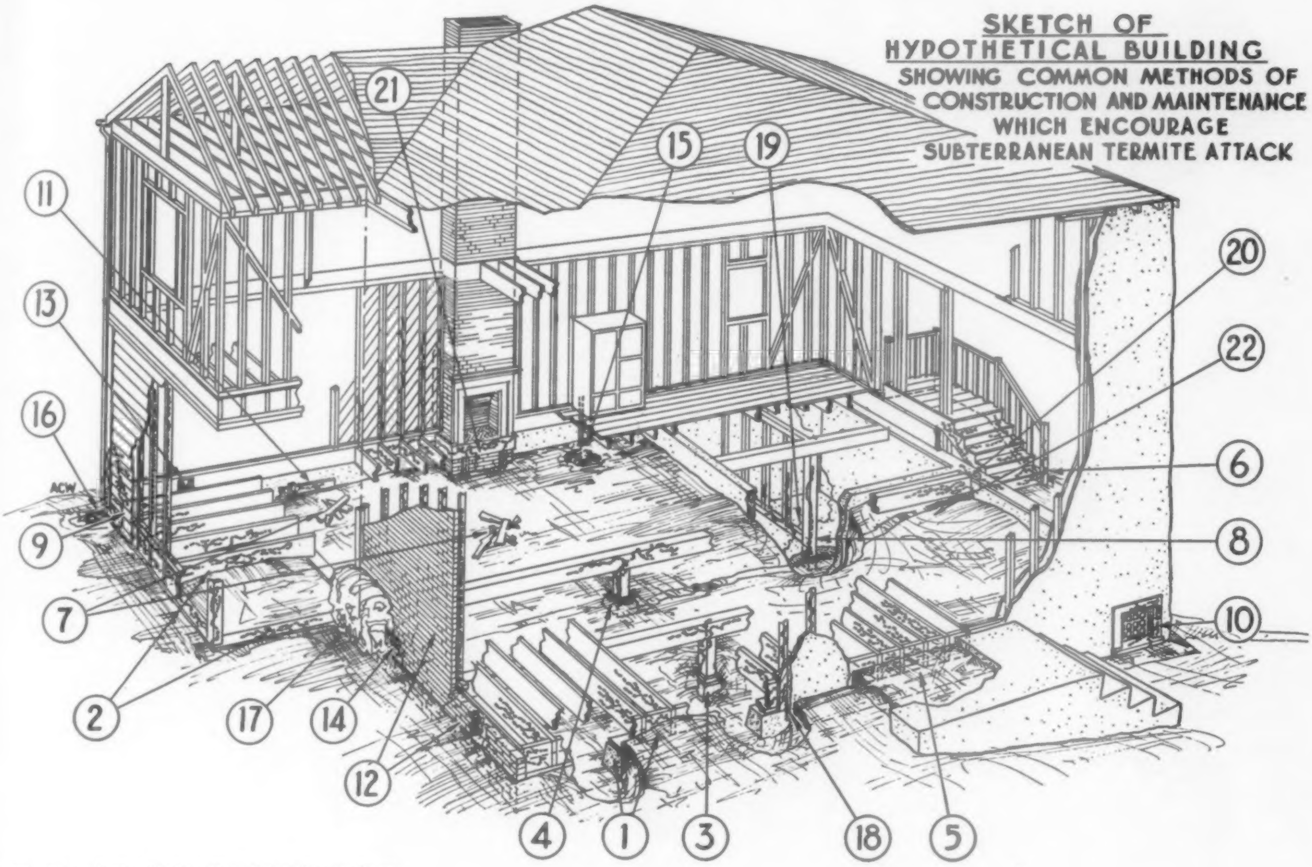
H. By cracks in concrete
- (19) Cracks in concrete floors (or walls) permit entry of termites.

I. By miscellaneous structural defects
- (20) Wood girder entering foundation wall not placed in wall box and end of girder not treated with preservative.
- (21) Wood placed near chimneys, where heat will attract termites.
- (22) Insufficient clearance between girder and ground below makes inspection difficult and permits easy access to the wood by the earthen towers built up from the ground below by termites.

Where it is necessary to have wood members in contact with or near the ground, or in contact with masonry foundations, it is recommended that such members be:

1. *Either* of a species and grade of wood which is known to be resistant to termite attack (cedar, cypress, redwood).[2]

[2] For a more extended discussion of these woods, see p. 548, op. cit.



Courtesy of the University of California Press

2. *Or* of a species treated under pressure with coal tar creosote or with chemical salts which have demonstrated their ability to make wood immune from termite attack (zinc chloride, chromated zinc chloride, wolman salts).[3]

As a good example of what *not* to do in constructing a new building, the sketch of a hypothetical building is herewith presented.

Existing Buildings—Not Infested

It is not easy to generalize on this subject, but where termites are known to be in the vicinity, several things can be done which will at least make future infestation less likely.

Most important, perhaps, is systematic inspection of the wood members which are nearest to, or in contact with, the ground. It is not always easy to detect the presence of termites, since they do not voluntarily expose themselves to light except during the swarming period. Their presence will often be indicated immediately after the first warm rains in the spring or in the fall, at which time the winged members of the colony come out of the ground and fly for a short distance, preparatory to finding a mate and setting up housekeeping in a new locality.

[3] For additional suggestions, see Chap. 36 et al., op. cit.

Where the presence of termites is suspected or known, it is well to take some or all of the following precautions:

1. Call in a reliable commercial firm of contractors engaged in termite damage prevention.
2. Inspect the woodwork immediately above the foundation every six months for evidence of termite infestation. (Look for typical mud tubes frequently built over masonry foundation walls from the ground to the woodwork above. Probe woodwork with an ice pick or knife, which will often indicate hollow spaces in the interior of the wood members.)
3. Poison the ground under the building and immediately outside of the foundation walls with chemicals known to be toxic to termites.[4]
4. Provide adequate drainage of the soil and ample ventilation in the area under the building in accordance with ordinary good construction practice.
5. Install, if practical, properly fabricated termite shields.

Existing Buildings—Already Damaged by Termites

Where termites have already infested the woodwork of a building, the damaged parts must of course be made safe. It is useless to do this, however, unless

[4] See Chapter 33, et al., op. cit.

Lower portion of stair carriage, which was in contact with ground at and below point marked by arrow. This timber should have been set on top of a concrete pier, but even casual inspection would have indicated the presence of termites months before it was badly damaged

further precautions are taken against subsequent damage. In the case of small frame buildings such as one-story schoolhouses, it may often be possible to raise the entire building from its (probably inadequate) foundations and to place an adequate foundation below the building, clean out all wood in contact with the ground, and thus be assured of reasonable protection from further damage. Properly fabricated and installed, termite shields will give more positive protection.

Where this is not possible, it is well to replace the damaged parts with wood, chemically treated under pressure, or naturally termite-resistant wood (cedar, cypress, redwood, etc., of the proper grade), and to poison the soil underneath and immediately adjacent to the outside walls of the building.[5]

[5] It is not possible in this article to recommend all the types of pressure treated wood or all the poisons which may be employed for these purposes. The advice of a qualified consultant is desirable and much information may be obtained from the book, "Termites and Termite Control."

One Hundred Per Cent Protection Against Termite Damage

In conclusion, it may be well to caution those interested in the maintenance of school buildings against the somewhat prevalent popular conception that termites are something new to worry about, that they are rapidly increasing, and that they will destroy all of our wood-frame buildings eventually if we do not look out.

The termite "scare" of a few years ago caused many "experts" to go into the business of repairing and preventing termite damage. The gullible housewife, told by a doorbell pusher that he was an inspector sent to investigate her house for the presence of termites, could hardly be blamed for being frightened when the inspector emerged from the basement of her home with a few wriggling white insects which may or may not have been in the inspector's pockets when he first entered the house. Although this stage of the scare seems to have passed, there are still numerous agencies which, for one reason or another, keep alive the propaganda that termites are about to do us out of house and home if we build with wood.

It cannot be too strongly emphasized that untreated wood in contact with the ground has been found to be cause for termite attack in 90 per cent of the thousand cases investigated by the Termite Investigations Committee. As indicated above, protection against termite damage in new buildings is relatively simple and inexpensive, and protection for existing buildings not already damaged by termites can usually be provided without much difficulty.

School authorities may be assured that good construction and good housekeeping will take care of at least 90 per cent of the termite hazard, and that known methods of construction and maintenance are available to take care of the other 10 per cent of possible damage by termites.

THE A B C'S OF WOOD FLOOR FINISHINGS

By LAURENCE PARKER

State Supervisor Trades and Industries State Board for Vocational Education, Pittsburg, Kans.

A VISIT to a chain store recently aroused old memories. The floor had been oiled. Close to counters, sheltered from traffic, was an area which was dark and dusty-looking. Out in traffic the floor was much lighter in color. The whole effect was unsightly and served to remind us of how schoolhouse floors used to look—and in a few cases still do.

Times have changed in the last few years, and the construction and finishing of school buildings have changed with them. Methods of floor finishing have proved of great interest to us and at times have mystified us. As a result, we have made a brief study of the subject, and through the cooperation of our friends who sell floor finishing materials and refinish floors, we have brought out the following paragraphs. We want to acknowledge our obligation to the men who have devoted much time to helping us to understand this subject.

Woods for Flooring

1. Woods are first divided into hard woods and soft woods. Hard woods such as oak, maple, beech and birch are more durable for floors. Oak makes a handsome floor because of a definite pattern or grain. Maple has hardness, toughness, freedom from slivering, and density. If properly prepared and cared for, it has a natural tendency to polish under traffic. Beech and birch are not often used, but make good floors. Hard pine is considered to be a soft wood. It is much used for school-building floors, but is softer and more absorbent of moisture, and has a decided tendency to sliver or splinter.

2. To the naked eye, properly prepared wood flooring appears to be a solid material. When it is put under a microscope, however, it is found to be full of holes or pores, like a janitor's sponge. These holes are really cells formed by the wood fibers. In different woods the cells are different in form, size and arrangement.

3. Woods for flooring are classified into open grain (wood with large cells), and close grain (small cells). In order that a floor of wood with large cells (such as oak and chestnut) may be satisfactory, it must be filled. Floors of close grained woods (such as maple, birch, and yellow pine) do not need filling.

Treatment of New Floors

4. When the flooring comes from the mill properly seasoned and ready to be laid, the cells or pores in the wood are filled with air. This air is easily displaced by moisture or dirt.

Many times after these floor boards with wide open pores are laid, they are tracked upon by plumbers, electricians, plasterers, often with muddy feet. Much

Courtesy of the National Oak Flooring Manufacturers Association

Well-finished floors can be swept easily with a treated dust mop

of the dirt and grime goes down into the pores of the wood, filling them up and permanently darkening the wood. The janitor then comes along with mop and strong scrub water and does his best to "clean the floor." He does get the top surface clean, usually, but he is lucky, indeed, if he gets much of the soil out of the pores. In the process, he has damaged the wood flooring because of the swelling and drying-out process to which he has subjected the boards. After the floor goes into service, the feet of school children fill the pores of the wood with dirt, and the janitor with his mop again completes the cycle. This will spoil the appearance of a floor and is harmful.

5. For many years, oiling floors with a thin petroleum oil was felt to be the best practice, and it is continued even now in some school systems. Such oils should never be used on any type of floor. They never dry or oxidize, as do vegetable oils such as linseed oil. They never completely fill the cells of the wood and do not form a hard surface. Traffic dirt and dust are caught by the oily surface and ground into the partly filled pores. This causes oiled floors to grow dark and unsightly. The surface becomes either sticky with dirt or slippery. Many of the floors which have been marred by oil treatment are being cleaned up, refilled and given a beautiful and more sanitary type of finish.

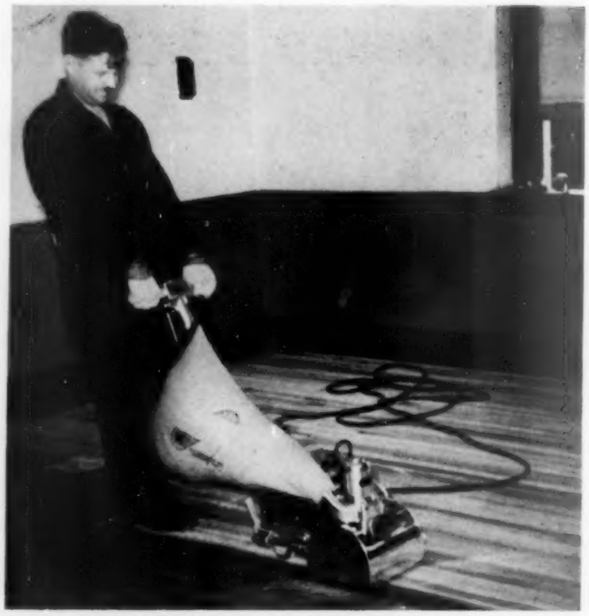
6. It is our understanding that some of the more progressive flooring manufacturers will ship seasoned flooring which has been sealed with a good seal after it has been milled and seasoned. It would seem to be sensible to fill the pores with a good seal at the mill or at once after delivery. This will help to keep moisture, stains, and discoloration out and prevent the dirt from the floorlayer's feet from filling the pores of the wood.

7. After a floor is laid, it should be sanded to a smooth, even surface in order that there may be no ridges or projections to prevent the janitor's mop or brush from easily removing all the dust and dirt from the floor. Floors sanded with coarse-grain papers appear to be satisfactory until seal is applied. They then present a scratched appearance. Care should be exercised to see to it that the sanding be finished off with such fine-grain sandpaper as No. 00.

8. Immediately after the sanding has been completed, the floor should be carefully swept free from all dust left by the sander. Some of this is very fine, and careful and thorough sweeping will be required to remove *all* of it. If possible, use a vacuum cleaner to remove the very last of this dust.

Floor Sealing

9. The floor should be sealed now with a seal which will completely fill the pores of the wood with a hard non-shrinking substance which is dirt-resisting.



Sanding a school floor

Some workmen suggest that the seal be first applied across the boards and then finished lengthwise of the boards. Enough coats should be applied to provide a surface gloss. This will insure the complete filling of the pores of the wood. After the first or second coat, a steel wooling, before subsequent coats, will improve the appearance of the floor. The first coat raises the wood fibers unevenly above the sanded surface. The steel wooling planes off these high fibers.

If the pores are carefully sealed, traffic dirt is kept upon the surface of the floor and either swept or damp-mopped off the floor without damage.

10. Floor seals are of two different types. There is the resinous gum or penetrating varnish seal. These seals penetrate the wood and seal the pores up to ⅛-inch below the surface. The wearing qualities of this type of finish depend upon the careful selection of the natural resins and the linseed oil used in its preparation.

A synthetic varnish has been developed in recent years which suspends bakelite or other phenol compounds. This, when of proper consistency, forms a very tough and durable seal to fill the pores of the wood. It is claimed that since this is a synthetic or laboratory product, its quality can be more carefully controlled than in the case of natural resinous gums. It is also claimed that rubber burns are much more frequent where this type of finish is used on gymnasium floors. While the synthetic seal does not penetrate the wood as deeply as the varnish seal, it is not affected by strong soaps and alkalies.

Good results can be secured by the careful application of either type of seal. The directions given

Chairs can be moved easily on a properly sealed floor without damaging it

A sealed floor from which dust and dirt can be easily swept is essential in a kindergarten room

A well-finished floor is durable and interesting

Illustrations courtesy of the Maple Flooring Manufacturers Association

upon the containers should be followed to the letter. More failures result from carelessness in this respect than from any other cause.

Top-surface Finish

11. From this point on, these who have charge of the upkeep of floors differ as to what should be done with them. Some believe that filling the pores of the wood is all that is necessary, and that after application of two coats of seal, you should steel wool all seal remaining on top of the surface. They expect the top fibers of the floor, together with the seal-filled pores between, to take the traffic of school children's feet. They argue that a top finish is expensive to apply and maintain and that traffic will wear paths through the finish. Maple floors treated in this manner make a good appearance under heavy traffic because of the tendency of maple to polish under clean-footed traffic.

12. Other authorities on floors believe that a carefully sanded and completely sealed floor should be given a coat of wax. They suggest that either the spirit wax or the water wax should be used. The latter is more convenient of application since it can be mopped on and the traffic of busy feet soon brings the floor to a satisfactory polish. It is claimed that this type of top finish will save wear on the floor because the coat of wax must be worn through before wear comes to the wood fibers. In the opinion of many janitors, dust is more easily removed from a wax finish than from any other type. Scientists even claim that friction by floor brushes or mops on a waxed floor sets up an electrical charge which helps to remove the dust. We wouldn't know about that.

13. Another school of floor finishers believe that the top fiber of the floor should be protected by a tough but hard varnish. The present-day synthetic or bakelite varnishes not only wear well but resist the effects of ice cream, inks, etc. Some finishers believe that traffic in classrooms is not too severe for top finish. Many agree that traffic in halls and on stairs is too heavy for a top finish, causing paths to be worn through it.

14. According to some maintenance experts, the top-surface finish should be further protected by wax. This will prolong the life of the top finish and will make the floor much easier to keep dusted. Either spirit wax or water wax may be used for this purpose.

Summary

15. To sum up this matter of finishing floors, we can say:

a.—Wood used for flooring has a cellular structure, full of pores.

b.—These pores will be filled with dirt if not filled with filler (in case of oak) or seal (with other woods).

c.—The seal must completely fill the pores to some depth. It must be as hard as the wood fibers and should be dirt- and acid-resisting.

d.—The top surface may be left bare, waxed, or given a hard wear-resisting surface.

e.—The top surface as well as the seal may be either of resinous gum or of phenol synthetic type.

f.—If given a wear-resisting surface, a protective coating of wax will postpone the necessity for renewal of the surface finish.

THE EFFICIENT USE OF VACUUM-CLEANING EQUIPMENT

By W. A. DAVENPORT

Superintendent of Buildings and Grounds Department, Michigan State College

VACUUM cleaners were rarely used for offices and schools until recent years. As they have become standard equipment in households, so they are becoming increasingly a necessity in the business world. New building constructions generally include this mechanical equipment in plans and specifications for factories, schools, and offices, so that the problem of cleaning newly constructed buildings is a minor one. The major problem is cleaning the older buildings.

Arguments against vacuum cleaning have little weight when the benefits of mechanical cleaning are properly considered. The first argument to arise is the cost of installation, yet over a period of years the initial investment shows a profit in dollars and cents as compared with the use of common labor for such work. Medical and engineering professions have been alert in grasping this sanitary method of cleaning because of its efficiency and substantially lower cost.

Too often vacuum cleaners are thought of as a household convenience. In addition to machines that are built for home use, there are special adaptations for all needs. There is a complete range of appliances for floors, walls, ceilings, mouldings, radiators, boiler flues, theater and auditorium upholstered seats, chalk rails, and many others. The larger units clean as many as 7,000 square feet per hour.

Undoubtedly the theory of cleaning is to "remove," not to "replace," dirt and bacteria, and only by the use of mechanical equipment can this aim be achieved. There is little doubt that sanitary conditions in the home, office, factory, and school have a great effect on the mental and physical condition of everyone. Orderliness of physical surroundings has an important relationship to orderly mental processes. Inasmuch as the classroom is the very center of mental training, the absence of dirt and dust and the presence of proper temperatures and good ventilation are important considerations. Clean and well-lighted classrooms and toilets have only to be contrasted with dirty, dark, and foul-smelling rooms to reveal forcibly the influence of cleaning upon school morals, school morale, and school discipline.

One of the most important problems of a school custodian is the subject of cleaning, which is a daily operation made necessary out of consideration for the health of the students. The cleaning of classroom floors is a major division of building service, and brooms, which were always more effective for stirring up dirt than for removing it, have been replaced by the modern vacuum-cleaning systems.

Vacuum Cleaners of the Domestic Type

Vacuum cleaners may be classified under two main groups: first, the house or domestic type; and second, the heavy-duty or so-called commercial type. Cleaners of the first group are very seldom used except in dormitories or offices where carpets, rugs, or draperies are maintained. They may be classified under four types, as follows:

1. Fan type with agitator which beats the floor-covering with an alternating metal bar and brush on a revolving drum, allowing the dirt to pass through the fan into the exhaust-bag collector.
2. Fan type without revolving agitator, allowing the dirt to pass through the fan and into the bag collector in the same manner as the first type.
3. Turbine type, which has the collecting bag in front of the fan. This eliminates damage to the fan blades when a hard object is picked up.
4. Water-trap type, which deposits the dirt into a temporarily sealed collector containing water. With this type, it is possible to remove the water-tank quickly and dispose of the dirty water. This type has many possibilities if and when it is built for heavy duty. Its principal feature is that no dust escapes back into the room, which might be called a decided improvement over the bag exhausting types.

Heavy-Duty Units

The heavy-duty or commercial units may be classified into two general types: first, the portable unit, which may be moved anywhere; and second, the built-in central system. The first, or portable group, may be classified into three types, as follows:

1. Fan type, with the same principle of operation as the house unit, the dirt passing through the fan. The difference is that it is larger in size and instead of the floor tool being attached directly to the motor it is placed at the end of a 14-foot hose which includes a five-foot metal adapter for the floor tool.
2. Turbine type in which the dirt does not reach the fan because it is deposited in two chambers

located between the floor-tool hose and the motor. The heavy dirt falls into the lower chamber, and lighter particles are deposited in an upper chamber. The hose lengths are 30 feet and 55 feet for the ⅓-hp and ¾-hp respectively. This length includes the 5-foot metal adapter.

3. Pump type. This is similar to the turbine type for dirt separation. However, the collector is in the form of two cones, one within the other. Instead of a suction fan or turbine generating the vacuum, it is produced by two revolving paddles. The hose used is made of rubber, wire, and fabric with a 1½-inch inside diameter. This is wound with heavy wire which looks like a spring coiled round the hose. The inner lining is of rubber. The outside covering is a rubberized fabric. It is necessary to wind the hose with friction tape because concrete floors cause considerable wear. The friction tape stiffens the hose somewhat but protects it well. Replacement of the tape is occasionally necessary.

The built-in central system is a typical turbine type unit installed in the basement and connected to all floors with metal tubes. It is necessary to install the tubes while the building is being erected. The inlet valves must be located conveniently in order to be able to reach all areas thoroughly. If there are not sufficient riser connections and the hose length exceeds 50 feet in length, vacuum efficiency is greatly decreased. Several of the larger buildings at Michigan State College are equipped with this central system. During the past few years, all new buildings have been equipped with the built-in central system because of the economy factor.

Reorganization of Procedures and Personnel

Previous to the writer's affiliation with Michigan State College, floor cleaning had been done with brooms. Not only was the cost enormous, but also the buildings lacked a clean and sanitary appearance.

Between 1929 and 1937 the floor area to be cleaned increased 67 per cent. However, the cost per square foot per year was reduced 40 per cent. This saving was effected by making two major changes. The first was the elimination of personal service to the faculty, which does not pertain to cleaning. The second change was that of using vacuum-cleaning equipment exclusively. Instead of having the dirt from the floors transferred to the walls, woodwork, and furniture by a swishing broom in the hands of an elderly and poorly trained man, it is now removed from the room by well-trained younger men with vacuum cleaners.

The introduction of vacuum units was an unpopular move with several of the older workers who had used brooms for so long a time that it had become not only a habit but a campus tradition. Furthermore, they preferred nine hours during the regular working day, much of which time was spent in being a handy man for faculty members. The vacuum work at night, or during the early morning hours, on a strictly maintained schedule, not only cramped their style but their muscles as well.

Cleaning Schedule

The time which should be allotted to a janitor for each classroom depends on the type of chairs and other room conditions. The cooperation of teachers and students is also an important factor, as it takes much less time to clean a classroom if there is no accumulation of papers and litter on the floor.

The vacuum-cleaning system is usually laid out on the basis of one sweeper for each twelve classrooms. No allowance is made for corridors, gymnasiums, or auditoriums, as these areas are all cleaned during the day when the classrooms are in service. However, classrooms must be cleaned at night after classes are dismissed, and usually two hours are allotted for this work. On the basis of twelve classrooms in two hours, an average of one room each ten-minute period is maintained. This includes the time required for carrying the equipment into the room, connecting it, and starting to work.

When vacuum units were first introduced, many janitors could not see the reasons for a change from the push-broom type of sweeping. A demonstration was conducted for their benefit. This test was run in a typical classroom containing 613 square feet of hard maple floor with relatively small cracks. It was equipped with thirty-four pedestal seats, a desk, and a chair.

For this test, one of the regular janitors for that building was timed while sweeping with a broom. He did not use sweeping compounds. It took him nine minutes, and he obtained two ounces of dirt including a gum wrapper. Immediately following this operation a new commercial fan-type vacuum was used over the same area. The operator was experienced in handling the unit. It took exactly eight minutes to remove an additional thirteen ounces. This meant more than six times the amount removed by broom, and it was done in one minute less.

Danger of Contamination and Incidence of Pests Reduced

It is an established fact that the use of a vacuum cleaner reduces the amount of dust thrown into the air during the cleaning process compared to sweeping with brushes or brooms. In the bacteriology building, where the raising of dust may become a very serious source of contamination, the use of a vacuum unit is a necessity. The vacuum cleaner has been beneficial in two ways: first, it causes less air disturbance than a broom; and second, the removal of dirt from

crevices between the boards reduces materially the amount of dust thrown into the air by the movement of people over the floors during the day.

The vacuum may also be an aid in reducing the incidence of insect pests, particularly cockroaches. In the bacteriology building, prior to the use of vacuum cleaners, a continuous fight was made against these pests. With the introduction of the vacuum cleaner the roach population was markedly reduced and, although the roaches are still present, there has been no need of further warfare against them. As further evidence it has been observed that whenever vacuum cleaning is discontinued the roaches reappear in increasing numbers. This information is presented purely as an observation, but the study of this problem would be worth the effort.

Although it is a known fact that the vacuum cleaner reduces the amount of dust in the air, it has been observed that cloth bags do throw considerable fine dust, which affects laboratory work. This observation is not new. You will perhaps recall the advertising claims of certain manufacturers of domestic sweepers that the use of paper bags, or water washes will reduce this problem to a minimum.

Factors in Decrease of Cleaning Budget

In conclusion, I might state that the decrease of 40 per cent in the cleaning budget in 1937 compared with that of 1929, with an increase of 67 per cent in floor area to be cleaned, was accomplished in this manner:

1. Drastic changes in custodial duties to decrease the academic and personal service to faculty and other college employees and performance only of that work which pertained directly to cleaning. The packing and moving of books, equipment, or other departmental properties is done only when work orders are issued against the account of the academic department requesting assistance.

2. Changing from brooms, dust pans, and sweeping compounds to vacuum-cleaning equipment.

3. Adopting regular working schedules. This change decreased the man-hours necessary during the regular working day and increased the man-hours necessary during the early mornings and late evenings.

4. Individual training of all men. This was necessary in order to have the vacuum-cleaning equipment handled properly to reduce maintenance cost of the fairly expensive equipment.

5. Gradual replacing of older men with young men physically fit for assigned duties. Our policy was not to discharge these older employees, but to transfer them to other Buildings and Grounds divisions or into buildings where they fitted into a particular cleaning situation. This gradual replacement fitted in very well with the individual training program previously mentioned.

6. Reconditioning of all wood floors. All the dark oily film was removed and the floors were treated with penetrating seal, followed with wax. In most cases only water wax was used, but in some areas paste wax was buffed in and then given a final coat of water wax. This increased the efficiency of the vacuum-cleaning system.

7. One portable vacuum unit is assigned to two or three small buildings. By working all machines on an average of over 8 hours per day the investment in vacuum units is kept at a minimum.

8. Having a central delivery system for cleaning and toilet supplies. The old system allowed each janitor to obtain supplies individually each day. The new system requires the time of one man and the use of a small delivery truck ½ day a week. This practice, alone, saves about 100 man-hours per week.

Maintenance cost, which does not amount to as much as the cost of brooms, dust pans, and sweeping compounds, is kept at the absolute minimum by careful usage and proper repair. An interesting comparison is that the heavy-duty unit does about 50 times more work per day than would be done by the average home cleaner. On the basis of a 10-year depreciation, this would mean that a house-type cleaner would have to last 500 years to do a proportional amount of work.

It might be stated that the use of vacuum-cleaning equipment is directly responsible for the decided reduction in the cleaning budget at Michigan State College since 1929 because the radical change from brooms to machines allowed the introduction of other new methods incidental to the new system as a whole.

THE HILLYARD SALES COMPANY

BRANCHES IN PRINCIPAL CITIES — St. Joseph Missouri — DISTRIBUTORS FOR HILLYARD CHEMICAL CO.

A National Maintenance Organization . . . Over Thirty Years Continuous Service

HILLYARDS' FLOOR PRODUCTS
for the Efficient Yet Economical Cleaning and Maintenance of School Floors

CLEANS SUPER PRESERVES
Shine-All
TRADE MARK
REG. U.S. PAT. OFFICE POLISHES REG. U.S. PAT. OFFICE

SUPER SHINE-ALL. Not a soap, but a neutral liquid chemical cleaner for all types of floors, also painted and varnished surfaces. It possesses 100% active cleaning units. Super Shine-All cleans, polishes, and preserves in one operation, requiring no rinsing. Saves time and labor. Officially endorsed by leading floor manufacturers. The one cleaning material that is qualified for safe use on every description of floor or wall surface.

HIL-TONE. Hil-Tone removes rubber burns and other marks from wood floors. It not only removes the marks easily when properly used but also seals and protects the wood itself. The wood retains its light color and does not become oily or greasy as when ordinary dressings are used.

HIL-BRITE. A self-polishing water emulsion wax that dries bright without rubbing or polishing, with a hard traffic-resisting finish, yet has that soft lustrous glow of polished wax. It saves time and labor; cuts your waxing and cleaning costs in half. Endorsed by national floor manufacturers.

ONEX-SEAL. Gives positive protection and restores the original attractive finish to terrazzo, tile and cement. Tests proved Onex-Seal capable of withstanding the most severe weather and traffic conditions. Onex-Seal produces a waterproof, weatherproof, dust-resistant, sealed polished surface. Nationally recommended by flooring contractors and manufacturers.

TERRAZZINE. Excels for thorough curing and sealing of new terrazzo, approved by the National Terrazzo and Mosaic Assn., also used and endorsed by leading terrazzo contractors and has a nation-wide reputation for highest quality. Economical and simple to apply.

HIL-GLO FINISH. Especially designed to serve on classroom and gymnasium floors. Universally used for the reclamation and preservation of wood floors in all types of buildings. Hil-Glo Finish is supreme for wearing quality, is non-skid, and does not easily rubber-burn.

SUPER GYM FINISH. Produces a non-slippery, durable and sanitary floor, easy to maintain. Withstands hard and constant wear; gives proper reflection of light, eliminating eye strain; insures a perfect non-slippery surface which will not rubber-burn. Nationally used by leading schools, universities and athletic clubs, private and public institutions.

To protect our customers against imitations all Hillyard products are registered and trademarked and shipped in sealed, checker board designed containers

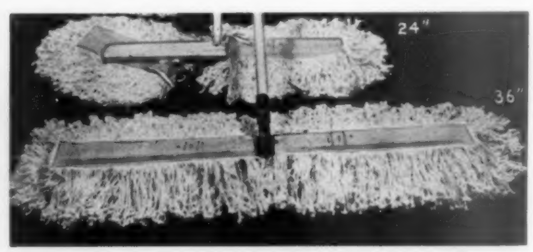
DIAMOND FINISH. Produces a brilliant, long-wearing surface, easy to apply with brush or mop. Quick-drying and especially adapted for wood floors.

PENETRATING SEAL NO. 21. The purpose of Penetrating Seal is to seal the fibre against penetration of dirt, ink stains and moisture, to preserve the natural color of the floor and provide a more permanent finish that is both beautiful and economical, and to reduce maintenance costs. Penetrating Seal No. 21 and Hil-Brite Self Polishing Wax is the ideal treatment for floors of classrooms, corridors, assembly halls, etc. This treatment preserves the natural color of the wood, is easily and economically maintained, and produces a durable and attractive finish.

HILLYARD'S WOOD PRIMER. Definitely seals and preserves; insures an ideal surface for the application of any desired finish or treatment. Universally used for the reclamation and preservation of wood floors in all types of buildings.

RENOVATOR. Hopelessly black and gummy floors can be brought out to look like new with Hillyard's Renovator. Oil-soaked wood floors can be scrubbed and bleached to a light color. The extra power in Renovator makes the toughest job easy.

DUSTLESS SWEEPING BRUSH. Leaves a clean lustrous surface, absorbs the dust, saves labor. The wicks are detachable and washable.



"FROM COAST TO COAST"

Madison Square Garden, New York, N. Y. — **Stanford University Basketball Pavilion, Palo Alto, Calif.**

HILLYARDS' MODERN FLOOR MACHINES

16-inch
For use in small buildings

19-inch
For medium work

22-inch
For heavy duty

Note low, streamline construction, permitting use under desks and furniture. You'll like the "Lowboy"

THE NEW HILTONIAN LOWBOY SCRUBBING AND WAXING MACHINE. Leads the field in utility, efficiency and economy. A favorite with all users. Speed, power and weight are co-ordinated to produce the utmost in service at a minimum of effort and expense. Correct mechanical principles result in a machine that is perfectly balanced, silent in operation, easy to handle, steady and straight running. The "Hiltonian Lowboy," being a multiple-brush machine, does a better job in less than ordinary time and more easily.

BRUSHES FOR EVERY NEED. Brushes are available, including Bassine, Tampico, Union Mix, Steel Wool Plates. There are also attachment plates to which sandpaper or burnishing pads can be easily fastened.

WINDO-CLEAN. This lightning cleaner dissolves grime and removes dirt. No effort. No mess. No hard work. Eliminates buckets, sponges, water, squeegees and chamois, and makes glass sparkle.

The New Steeltonian *for heavy duty*

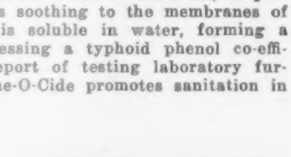
HILLYARD'S STEELTONIAN STEELWOOLING MACHINE (built in 10" and 20" Models). Modern floors demand modern maintenance methods. The "Steeltonian" economically reconditions and maintains floors of wood, linoleum, asphalt tile, rubber tile, etc. Uses standard type of steel wool in ribbon form, which is easily applied. No expensive patented steel wool drums to buy.

OTHER HILLYARD PRODUCTS. Besides floor finishes and waxes, floor brushes and floor machines, Hillyard's full line of 97 products includes cleaners, disinfectants, deodorants, soaps, modern janitors' equipment and sanitary appliances all types of brushes, toilet paper and paper towels and many other items for school use.

VICTOR SOAP DISPENSER. Built substantially in modernistic design with frame of brass, chromium plated. The bowl of opalescent glass, hung in the frame on an eccentric balance, automatically rights itself, preventing loss of soap by drippage. No springs to get out of order. A ball-bearing valve releases small amounts of soap. **Adapted to two positions, either upright or mounted on wall.**

VELVA-SAN HAND SOAP. Shipped in concentrated form, insuring the customer of 100% value in every gallon. Although usually shipped and prepared in its natural state, Velva-San may be had in various colors and perfumes. Velva-San provides individual hygiene when used in our dispensers. It is a forward step toward eliminating sickness and disease spread by unsanitary bar soap.

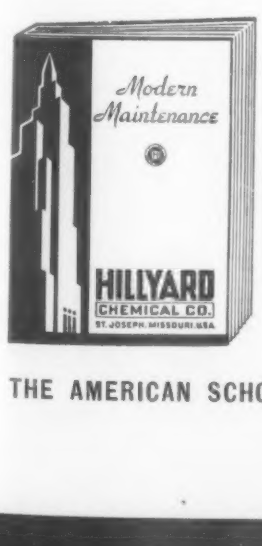
HI-KO DISINFECTANT. A concentrated stabilized sodium hypochlorite solution. When diluted with water in large proportions, it is effective as a sterilizer, antiseptic, germicide and deodorant. Used in correct solution in a rubber foot bath tray it helps to rid showers and locker rooms of the troublesome germ which causes "Athlete's Foot."

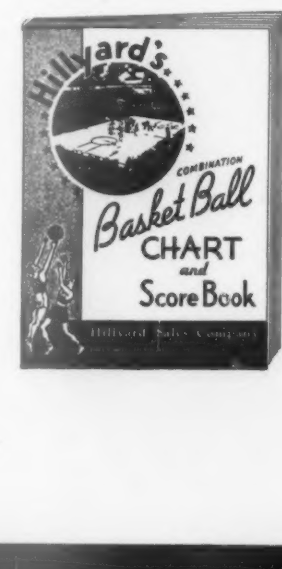


Rubber Foot Bath Tray

PINE-O-CIDE, ANOTHER EFFICIENT DISINFECTANT. An efficient liquid, amber-colored, both antiseptic and disinfecting. Compounded from steam double distilled Pine Oil, it possesses a pleasant pine odor which is soothing to the membranes of the nose and throat. Pine-O-Cide is soluble in water, forming a beautiful milk white emulsion, possessing a typhoid phenol co-efficient of five, "F.D.A." Method (report of testing laboratory furnished on request). The use of Pine-O-Cide promotes sanitation in schools and public buildings.

FREE ON REQUEST . . . FOUR VALUABLE HELPS





J. I. HOLCOMB MFG. COMPANY

— Manufacturers of *SPEED* Cleaning Tools —

New York | Indianapolis, Indiana | San Francisco

"Cleaning Headquarters"

JUMBO DUSTLESS SWEEPER

Thousands of dirt absorbent strands pick up the dust ordinary sweepers miss. It's NOISELESS, Fast, Sanitary and Washable. Three tools in ONE, it sweeps, dusts and polishes "at a walk." There's no back-stroke necessary. Block widths up to 42 inches.

"CUSH-END" SWEEPERS

Built-in rubber cushions on each end of the block encourage FASTER sweeping. There's no danger of damage to block ends or furniture and it's NOISELESS. "Cush-Ends" are available with four of the nationally known Holcomb sweepers; the PEKIN, MEMPHIS, MASTER and UNIVERSAL.

THE FAMOUS NO. 6 TOILET BRUSH

This nationally famous toilet brush is built "ON" not "IN" the handle. Stiff Bassine wings get that under-the-rim scum and odor. Head of aggressive Palmetto Fiber fits the bowl sides and drain hole. Sturdy, straight handle permits around the bowl cleaning without changing grip. It does all this FASTER. That makes it a money maker for you in THREE ways.

HOLCOMB PURITINE CLEANING COMPOUND—NON-CAUSTIC DIRT AND GREASE SOLVENT

There is **one** cleaner for every school cleaning problem . . . PURITINE—a "3 ingredient" 100% active and 100% soluble, cleaning powder. Removes gummy oil and dirt . . . leaves a non-slippery floor in halls and cafeteria. Grimy, ink-stained desks and furniture come clean with Puritine . . . **economically.** Painted walls . . . glassware . . . are all cleaned safely, surely, swiftly with Puritine.

325 lb. Bbls.; 150 lb. ½ Bbls.; 100-50-25 lb. Pails.

TEST IT YOURSELF — FREE!

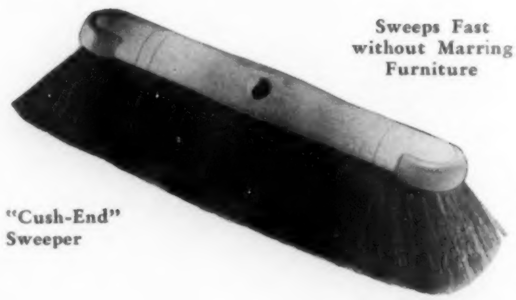
Write for FREE Sample Can of Puritine and 24-page booklet of Puritine uses. It's ONE cleaner for EVERY cleaning job. **You** try it . . . we'll let Puritine do its own proving.

Holcomb Tools Do a Good Job FASTER!

Sweeps, Cleans, Polishes

Jumbo Dustless Sweeper

Sweeps Fast without Marring Furniture



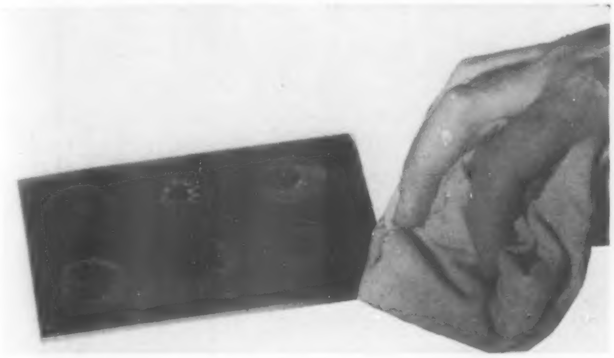
"Cush-End" Sweeper

The "Wings" Get Under the Rim

No. 6 Toilet Brush

. . . and the usual solution costs only "a Penny a Pail"?

J. I. HOLCOMB MFG. CO. | **INDIANAPOLIS, INDIANA**



Make This Test *Yourself*. Send for Sample!

Tested on the floor of the "Ford" Rotunda, Holcomb Water-Proof Wax **lasted four times longer** than waxes they formerly used. **This cut application time cost 75%!** Upper left spot is "WATER-PROOF."

Holcomb WATER PROOF WAX

The Most Water Proof Wax Money Can Buy!

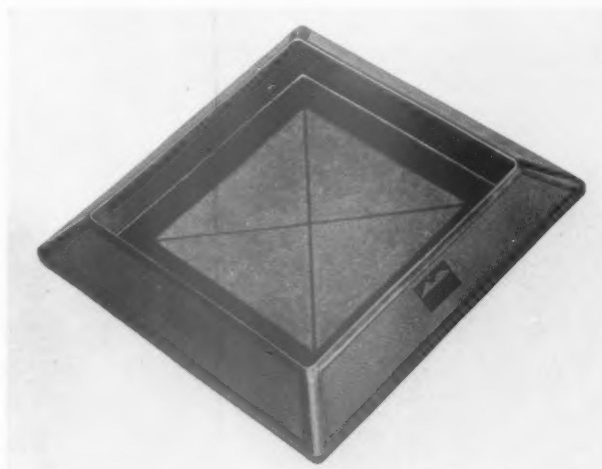
Holcomb WATER-PROOF WAX *IS* waterproof. Test it against any waterproof wax you are now using. Put spots of Holcomb Water-Proof Wax and other waxes on a piece of glass and allow them to dry. Drop water spot on them all. Let stand and then wipe off. Note how water will NOT loosen Holcomb Wax . . . proving it can be wet mopped without removing wax. It wears longer—it patches perfectly in traffic lanes.

Holcomb

FOOT-BATH FUNGICIDE

"Athlete's Foot" Preventive

This is a liquid concentrate, the diluted solution of which **kills** the fungus causing "Athlete's Foot." It is stable in solution and odorless. Use it in foot baths (see cut), in shower and locker rooms, gymnasiums and in swimming pool entrances and exits. It is an effective disinfectant, either sprayed or mopped on floors. It is economical . . . DILUTES 1 PART TO 100 PARTS OF WATER.



Holcomb No. 900 Foot Bath Hard Rubber, 26½" x 26½" x 3¹³⁄₁₆"

Holcomb

SEAL COAT

Seal Coat **penetrates** and **combines with the wood** to form a hard, protective tread . . . does not build up on top of the floor. Heavy school traffic would have to wear off the wood to wear off Seal Coat! One gallon of Seal Coat plus one gallon of turpentine retreads 1000 to 1600 sq. ft. of floor . . . and keeps it like new. Save an hour a day on floor maintenance time with Seal Coat . . . make a **new profit** of $100.00 a year! (Labor at 40¢ an hour.)

Shipped in 55-30-15 and 5 gallon drums.

J. I. HOLCOMB MFG. CO. **INDIANAPOLIS, INDIANA**

MIDLAND CHEMICAL LABORATORIES
INCORPORATED

Dubuque, Iowa, U. S. A.

Depreciation and deterioration begin the moment a building is opened to the public. In some cases the rate of deterioration is a great deal more rapid than in others—due, not to inferior materials and workmanship that might have gone into its construction, but rather to improper maintenance materials and methods.

Midland Quality is based on the principle that proper maintenance is cheaper than replacement. Schools and Universities that have been using Midland Maintenance Methods and Materials for over a third of a century bear witness to the truth of this concept and serve as excellent testimonials to the integrity of the products listed below.

A GYMLOH Finished Maple Gymnasium Floor

GYMNASIUM FLOORS

Bodily contacts and rough playing have given way to speed and maneuverability in indoor athletics. This necessitates a superior gymnasium floor finish—one which gives traction for quick pivots, ability to resist the frictional heat of sudden stops and one whose appearance will not be marred by numerous rubber burns. Many serious injuries have been sustained by players called upon to perform on inadequately finished floors. The amount of one medical bill averted will pay for the extra safety, wear and appearance obtained from a GYMLOH Finished Floor.

Visiting Coaches and Players will appreciate seeing this symbol of your regard for their safety

LOHSEAL—Penetrating Floor Seal

LOHSEAL is made from phenolic resins, formulated not only to seal the pores of wood against dampness and dirt, but actually to penetrate and reinforce the cellular walls against traffic. This resiliency is not effected through the use of gummy, semi-drying oils, but by the inherent properties of the quality materials that are used in LOHSEAL.

LOHSEAL is an excellent undercoat for either wax or surface finishes and may be used advantageously on concrete, old linoleum and wood floors.

GYMLOH—Special Gymnasium Floor Finish

Midland was one of the first to see the advantages offered in a phenolic resin type of finish in relationship to gymnasium floors. The careful blending of phenolic resins, Tung Oil and other essential oils creates a long-wearing, non-slippery floor finish of exceptional beauty and ease of maintenance. A GYMLOH finished floor is highly resistant to rubber burns, frictional heat, average stains, alcohol, dilute acids and alkalies. Applied with a lamb's wool applicator.

EV-R-GLO—Water-resistant Wax

Without polishing or buffing, your floors can have a lacquer-like lustre that is not readily removed by traffic or water-mopping. EV-R-GLO's wearing qualities are due to its high content of Prime No. 1 Yellow Carnauba Wax, the hardest, highest quality, natural wax known; its emulsifier contains no paraffin, shellac, oil or petroleum derivatives injurious to wood, asphalt or rubber tile, terrazzo, marble, linoleum or composition surfaces. EV-R-GLO presents an extremely low slip-hazard. Easily applied with special felt applicator.

MID-CEDAR—Dry Mop Preparation

Modern floors require modern methods of maintenance. To this end MID-CEDAR was developed. Cedar oils and other volatile oils were compounded to give a preparation which, when sprayed lightly on clean, cotton strand mops and dried, removes daily accumulations of dirt and soil without raising objectionable dust or leaving a sticky film with which to attract more dirt.

Regular use of MID-CEDAR is an investment in economical maintenance; it actually costs less than soap and removes the necessity of frequent scrubbing.

An EV-R-GLO Treated Classroom Floor

FINISH FACTS

A Condensed Summary of Midland Application Methods

GYMNASIUM FLOORS—Sand floor and sweep thoroughly. Apply one coat of LOHSEAL, allow 24 hours drying time and steel wool. Paint in game lines. Apply first coat of GYMLOH, allow to dry 24 hours, steel wool and apply finishing coat of GYMLOH.

CLASSROOM FLOORS (WOOD)—Sand floor and sweep thoroughly. Apply two coats of LOHSEAL, allowing 24 hours drying time between coats, and steel wool each coat. Follow with two, thin, even coats of EV-R-GLO WAX, allowing each coat to dry over night. Maintain with MID-CEDAR.

A COMPLETE LINE OF FLOOR FINISHES, SEALS, WAXES AND CLEANSERS, DISINFECTANTS, LIQUID AND JELLY SOAPS, INSECTICIDES AND GENERAL CLEANSERS

Listed below is a partial list of Midland Products of special interest to Schools. Nothing but the finest raw materials go into the manufacture of Midland Products, and each one is designed to fulfill a specific place in School maintenance.

Rigid laboratory control during the process of manufacture assures the user of getting the same high quality and uniformity in each and every order that he receives.

SOIL-SOLV—Combination Detergent and Quality Liquid Soap

SOIL-SOLV is a neutral cleanser with an increased "wetting" ability, which enables it to remove embedded dirt and grime with very little effort while, at the same time, being completely safe to use on wood, linoleum, cork, terrazzo, marble, tile or composition floors, painted or varnished walls and woodwork. Its easy rinsing properties make for better cleaning with smaller effort.

LOHADOR LIQUID HAND SOAP—For Use in All Liquid Soap Dispensers

LOHADOR LIQUID HAND SOAP is one of the finest hand soaps on the market today. Its smooth blend of cocoanut, castor and olive oils produces a soap mild in nature and strong in cleansing action. **LOHADOR** may be diluted several times its own weight and still retain the fine lathering and cleansing properties. Its anhydrous content ranges between 42% to 44% and it contains no added fillers, such as sugar or sodium silicate.

Odors: Bay, Bouquet, Lemon and Lilac

NEO GERMOLYPTUS—Germicide and Disinfectant

NEO GERMOLYPTUS will be found a safe and easy method of disinfecting toilets and classrooms. When used in proper dilutions with scrub water, it is an exceptionally speedy means of disinfecting entire Schools in one operation. **NEO GERMOLYPTUS** has no strong, medicinal odor, but rather has a pleasant slightly perfumed smell. An efficient means of deodorizing and disinfecting athletic equipment, such as jerseys, socks, trunks, etc. In its recommended solutions it is relatively non-irritating to the user and will not attack metal, rubber goods, cottons or woolens when used according to directions. Used and endorsed by many of the leading Hospitals.

A SHILOH Maintained Lavatory

FINISH FACTS (Continued)

LINOLEUM (OLD)—Clean with **SOIL-SOLV**. Rinse well and dry thoroughly. Apply one coat of **LOHSEAL**, then follow directions for new Linoleum.

LINOLEUM (NEW)—Apply one thin coat of **EV-R-GLO**, allow to dry over night, then apply second coat of **EV-R-GLO**. Maintain with **MID-CEDAR**.

ASPHALT AND RUBBER TILE—Clean with **SOIL-SOLV**, then apply two, thin, even coats of **EV-R-GLO**, allowing each coat to set over night. Maintain with **MID-CEDAR**.

TERRAZZO—Scrub well with **SOIL-SOLV**, rinse and allow to dry thoroughly. Apply one thin coat of **EV-R-GLO**. Maintain with **MID-CEDAR**.

SHILOH—Porcelain Cleaner

SHILOH contains an abrasive element so finely ground as to be completely gritless. In addition to this, a chemical emulsifier loosens and lifts oil, grease and embedded soil. Shiloh is one of the fastest-acting cleansers of this type on the market and may be used with complete safety on enamelware, vitreous china, earthenware and stainless steel.

MIDLAND *Electric* FLOOR MAINTENANCE MACHINES

SCRUBBING, POLISHING AND STEEL WOOLING

Midland **FLOORMASTERS** are durable, precision-built machines, highly efficient yet priced surprisingly low. It will be found that a more thorough conditioning and maintaining of all types of floors is assured through the use of a **FLOORMASTER**. Because large floor areas can be covered with exceptional speed and ease, Midland **FLOORMASTERS** make a dividend-paying investment.

FLOORMASTER FIFTEEN

This Floor Machine is of the single disc type, built extremely low over the brushes to facilitate getting under low-placed objects, such as desks, etc. Equipped with Timken roller bearings throughout. Motors are standard, vertical, 1/3 h.p. type, with silent V-Belt drive. Three brush segments, which make a 15 inch spread, are easily and quickly attached or removed. Net weight of machine—65 lbs.

FLOORMASTER SIXTEEN

These powerful and speedy machines are silent and vibrationless in operation, totally enclosed, and of worm gear drive. The twin intermeshing brushes revolve in opposite directions, thus eliminating all side pull. Motor is of 1/3 h.p., heavy-duty ball bearing type. The quickly interchangeable brushes create a working area of 16 inches. Net weight of machine—115 lbs.

FLOORMASTER TWENTY-ONE

This machine is designed to do big jobs with a minimum of effort on the part of machine or user. Same general specifications as **FLOORMASTER SIXTEEN**. (Exceptions: Motor 1/2 h.p., heavy-duty ball bearing type—brush spread, 21 inches—net weight 157 lbs.).

Below: **Gymnasium, Lee Edwards School, Asheville, N. C.**

Finished with Selig's JIM KOTE

JIM KOTE

A mighty fine, chemically balanced bakelite and tung oil gymnasium finish. Does not rubber burn, impervious to alkali, salt water, alcohol and common acids. Easily maintained. Plenty of traction. An ideal finish. Our numerous satisfied customers are, we believe, the best judges.. Their complete satisfaction makes us believe you also will be pleased. Jim Kote is easily applied by the mopping method.

FLOR-O-SEAL

Especially developed for classroom use. This penetrating seal, when properly applied, does not leave a surface film. Thus, Flor-O-Seal does not show unsightly traffic lanes. It wears well, is easily maintained and is economical. The application is very easy and simple.

FLOOR MAINTENANCE SERVICE

The SELIG trained and experienced floor maintenance engineers are qualified to assist you in any problem of scientific floor finishing and maintenance. They will gladly assist you in setting up the proper and most economical schedule of maintenance. Please discuss your problems with us freely.

We manufacture a complete line of floor maintenance materials and equipment. Our various materials have been approved by the leading makers of flooring materials such as Wood, Linoleum, Cork, Rubber and Asphalt Tile, Marble, Terrazzo, Magnesite, Masonite, etc.

DISINFECTANTS — INSECTICIDES — LIQUID TOILET SOAPS

In addition to the famous line of floor materials, the name SELIG has been synonymous with the highest standards of Disinfectants, Insecticides, Liquid Toilet Soaps and Sanitary Supplies for over forty years.

Put your problems up to us and permit us to offer suggestions and advice. There's no obligation involved and it may be of mutual benefit. Write for our big free complete catalogue.

THE SELIG COMPANY, INC.

DALLAS ATLANTA NEW ORLEANS

Manufacturers of

Floor Finishes — Waxes — Cleansers — Polishes

ESTABLISHED 1896

THE AMERICAN CRAYON COMPANY

Manufacturers of a Quality Line of Floor Sealers and Finishes

Sandusky, Ohio

BRANCH OFFICES

New York, N. Y., 9 Rockefeller Plaza — San Francisco, Calif., 116 New Montgomery Street

Dallas, Tex., Santa Fe Building

•KAYSAN—THE PERFECT SEALER AND FINISH FOR EVERY HARD-SERVICE CONDITION

•KAYSAN is manufactured by the makers of the first penetrating varnish developed for heavy-duty, hard-service wood floors. It is recommended without reservation for schools, stores, factories, offices, clubs, public buildings, apartment houses and similar types of buildings where wood floors receive excessive wear but must be attractive and in keeping with their surroundings. KAYSAN can be used effectively not only on wood but also on terrazzo and on linoleum (battleship and inlaid).

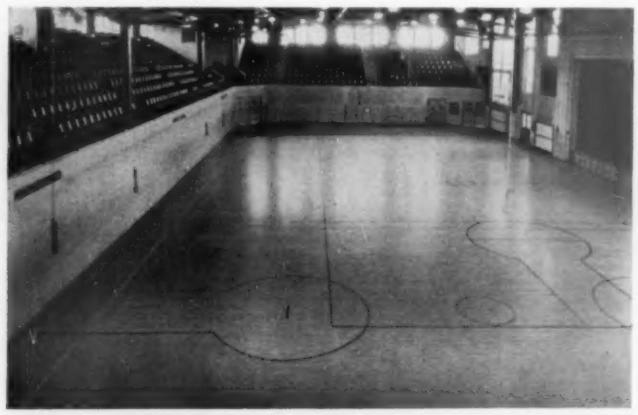
KAYSAN Has All These Remarkable Qualities

Brings out the full beauty of the grain
Needs never be refinished
Will not show laps
Dries bone dry
Withstands the hardest usage
Easily cleaned
Reduces time and labor
A very durable finish
Applies easily, seals the wood, prevents slipping, gives a lustrous finish and takes hard wear.

KAYSAN allows the wood to more nearly retain its natural wood appearance than any other finish.

Cost of Application

Its ease of application and minimum cost of maintenance makes finishing with KAYSAN very economical.



One of the many High School Gym Floors finished and maintained year after year with Kaysan

Covering Capacity

Under average conditions, 1 gallon of KAYSAN finishes on oak, approximately 300 square feet with three applications; on maple, 400 square feet with two applications.

FILTITE—An excellent seal and finish recommended for concrete floors and similar surfaces. It fills the pores, binds the small particles of concrete together, preserves, toughens and prevents dusting, improves the appearance, and at the same time seals the concrete against the penetration of grease, oils and many other stains.

FILTITE is easily, quickly and economically applied and maintained. Write for full directions, prices, etc.

Other OLD FAITHFUL Finishes

KAY-BRITE WAX (dries with a shine without polishing) and KAY-WAX Paste Floor Waxes.

OLD FAITHFUL Products are backed by 107 Years of Successful, Expert Manufacturing Experience.

1835–1942

OLD FAITHFUL

Also Crayons, Water Colors, Pencils, Inks, Pastes, and other OLD FAITHFUL Products

• Reg. U. S. Pat. Off.

WEST DISINFECTING COMPANY

42–22 West Street, Long Island City, New York

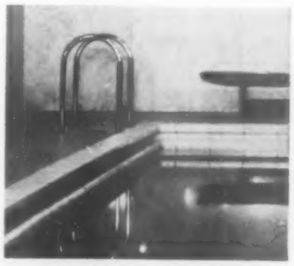
MANUFACTURERS AND DISTRIBUTORS OF

Liquid Soap Dispensing Systems	**Toilet Tissues**	**Kotex Vending Machines**	**Cleansers**
Paper Towels and Cabinets	**Disinfectants and Deodorants**	**Insecticides**	**Floor Finishes**

BRANCH SALES OFFICES

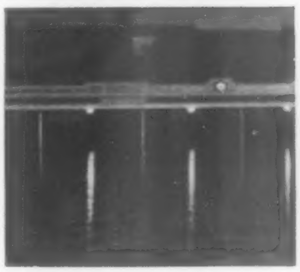
Albany, N. Y.	Denver, Colo.	Jersey City, N. J.	Omaha, Neb.	San Antonio, Texas
Albuquerque, N. M.	Dallas, Texas	Kansas City, Mo.	Philadelphia, Pa.	San Francisco, Cal.
Baltimore, Md.	Des Moines, Iowa	Los Angeles, Cal.	Pittsburgh, Pa.	San Jose, Cal.
Birmingham, Ala.	Detroit, Mich.	Louisville, Ky.	Portland, Ore.	Seattle, Wash.
Boston, Mass.	Evansville, Ind.	Memphis, Tenn.	Providence, R. I.	Spokane, Wash.
Buffalo, N. Y.	Ft. Worth, Texas	Milwaukee, Wis.	Richmond, Va.	Syracuse, N. Y.
Chicago, Ill.	Hartford, Conn.	Newark, N. J.	Rochester, N. Y.	Toledo, Ohio
Cincinnati, Ohio	Houston, Texas	New Orleans, La.	St. Louis, Mo.	Tulsa, Okla.
Cleveland, Ohio	Indianapolis, Ind.	Oakland, Cal.	St. Paul, Minn.	Washington, D. C.
Columbus, Ohio	Jacksonville, Fla.	Oklahoma City, Okla.	Sacramento, Cal.	

AND PRINCIPAL CITIES IN CANADA



SHOWERSAN

A new odorless disinfectant, which if used as directed, will help prevent the spread of "Athlete's Foot." Also used to disinfect washrooms and locker room floors, dressing rooms, runways and diving boards. Showersan will help maintain your swimming pool in a sanitary condition. A West Rubber Foot Tray, filled with a solution of Showersan should be placed in the entrance to the shower room.



LASTINCOTE

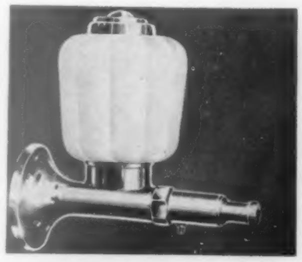
An easily applied beautiful, glossy yet non-skid finish, especially prepared to stand up under gymnasium wear and tear, or other heavy traffic. Hard enough to help retard the action of rubber burns and scratches resulting from hard usage. Lastincote makes floors much more resistant to alcohol, body perspiration, alkali soaps, acids, boiling water, ink, oil, grease, salt or fresh water. Approved by Maple Flooring Mfrs. Assn.

DEODORANTS

An efficient method of deodorization in lavatories is the West Automatic Drip Machine. The special drip fluid spreads on the surface of the water, and helps overcome bad odors at the source. However, no matter how efficient automatic deodorization may be, the daily or routine use of a cleansing disinfectant such as Coro-Noleum on washroom floors, basins, seats, etc., is important.

KOTEX VENDING MACHINES

Available in 2 sizes—D type, holding thirty Kotex pads, and the smaller No. 6 cabinet for use where available wall space is limited. Both coin operated. Each Kotex pad individually wrapped in sealed envelope with two safety pins. Packed in cartons of 300.



LIQUID SOAPS

West Liquid Soaps are uniform and of superior quality. Made of pure vegetable and coconut oils, the finished product is treated, aged and retested several times before leaving the factory. West Liquid Soaps tend not to irritate or dry the skin. Liquid Soap besides being sanitary and safe, eliminates waste of partially used cake soap which might be thrown or taken away.

LAN-O-KLEEN

A hand cleaner of especial value to manual training and industrial training classes in protecting against occupational skin diseases. Lan-O-Kleen is made of corn-meal in which has been impregnated lanolin oil. This new product removes stubborn dirt, oils and greases and also tends to replace natural oils in the skin. Samples available for the asking.

PAPER TOWELS

The West Disinfecting Company manufactures a complete line of paper towels from fresh, clean pulp in its own mills. Standardized quality is obtained by expert scientific manufacturing control. West Towels are made in either Junior or Senior sizes and in 32 lb. or 38 lb. basic weights. In addition, the Tandem (double towel) is obtainable and is popular with institutions where costs are carefully checked.

FREE—"Scope of Sanitation"

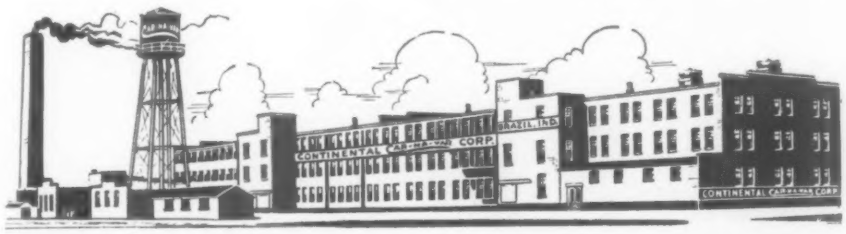
Write West Disinfecting Company, 42-22 West Street, Long Island City, N. Y., for your free copy of this valuable booklet. Profusely illustrated. Contains detailed information on these and many other products for the promotion of sanitation.

. . . PRODUCTS FOR THE WEST A WEST GUARANTEED PRODUCT WEST PROMOTION OF SANITATION

CONTINENTAL CAR-NA-VAR CORPORATION

1527–29 E. National Ave., Brazil, Indiana

WAREHOUSES AND EXPERIENCED FLOOR MAINTENANCE ENGINEERS IN PRINCIPAL CITIES OF THE U. S. A.



World's Largest Manufacturers Specializing in FLOOR TREATMENTS FOR LARGE FLOOR AREAS IN SCHOOLS AND UNIVERSITIES

CAR-NA-VAR

THE PERFECT FLOOR TREATMENT

MOST DURABLE FLOOR TREATMENT EVER MADE

Car-Na-Var is the original varnish-gum and wax floor treatment that combines the durability of varnish with the scratch-resisting qualities of wax. Gives a beautiful, lustrous WATERPROOF finish to all types of floors except rubber and asphalt . . . is non-slippery. Car-Na-Var requires no undercoat of sealer . . . although it is readily applied over any seal. (Meets U. S. Treasury specifications for "Undercoater A.") Use Car-Na-Var if you have an electric floor machine for buffing . . . it requires more initial labor than a self-polishing wax but is much longer lasting. Applied with a mop; ready for use in an hour. Supplied in "natural" (stainless), Dark Oak, Light Oak, Walnut, Cherry, Mahogany, Maroon, Olive Green and Mission.

CAR-NA-LAC

LACQUER-LIKE FLOOR FINISH

If you do not have a floor machine or buffer, use Car-Na-Lac . . . it is "self-polishing." Radically different from all other self-polishing floor treatments! Easily applied with mop or cloth, it goes on like lacquer . . . leveling itself out to a brilliant streakless luster . . . dries like wax in less than 30 minutes. Can be used on all types of smooth, sealed or fairly non-porous floors including rubber and asphalt. Waterproof . . . non-slippery.

CAR-NA-SEAL

WEARS LIKE LEATHER

SPECIALLY DEVELOPED FOR GYMNASIUM FLOORS

A deep-penetrating seal for all wood floors—tough as leather yet thoroughly pliable—that gives a smooth satin-like luster, free from streaks and scratches. Car-Na-Seal requires no buffing. Marks left by rubber soles (rubber burns) are easily removed. Made from Bakelite and other phenolic gums, specially processed for longer wear. Although used frequently as an undercoater for Car-Na-Lac and Car-Na-Var, Car-Na-Seal is an ideal top dressing for gymnasium floors. Provides a firm, safe footing. Preserves the floor by excluding moisture and dirt from the pores . . . protects markings of basketball court, etc. Car-Na-Seal also provides an excellent finish for school desks. Meets U. S. Treasury specifications for Sealer C.

CONTINENTAL "18"

THE SUPER FLOOR FINISH

A super-finish for floors; made and applied in exactly the same way as Car-Na-Lac but contains about 38% more solid content. Designed for extra heavy duty. Recommended by Aetna Life and affiliated insurance companies for safety. Meets U. S. Treasury Department specifications for "Finish Material."

SILENT CHIEF ELECTRIC FLOOR MACHINE

Like driving a high-powered automobile, the "Silent Chief" actually runs itself . . . you merely hold lightly onto the handle to steer. Special geared-head motor gives maximum efficiency . . . yet hours of polishing, scrubbing, steel wooling, sanding or grinding will not tire the operator because its perfect balance calls for no physical effort. Can be easily converted into a rug-scrubbing machine. Available in 5 sizes.

FREE BOOK!

Tells how 18 superintendents and building managers of important schools, hospitals, office buildings and other public institutions cut floor maintenance costs. Gives actual figures and specific details. Sent FREE to maintenance executives. Write for your copy today . . . on your business stationery, please. There's no obligation attached.

THE KENT COMPANY, INC.

174 Canal Street, Rome, N. Y.

BRANCHES IN PRINCIPAL CITIES

ELECTRIC MOPPER (Dirty Water Pick-Up)—Equipment to Clean and Preserve School Floors

A practical, time saving method of removing dirty water by suction from all types of floors after scrubbing. Prevents water from seeping into cracks of floor. Kent Electric Mopper will cut down many hours of floor scrubbing time and insure faster drying. It is easily portable, has powerful suction, and is one of the most popular pieces of maintenance equipment yet designed for use in schools.

SUCTION CLEANER—Vacuum Cleaning for Speed and Efficiency

Clean your school the modern, dustless way with a Kent Suction Cleaner! Sweeping with a broom does not remove dirt from cracks, and has a tendency to stir up dirt and dust, scattering it on walls, ceilings, shelves, etc., which causes an unhealthy condition. The Kent Suction is a small, powerful unit, easily moved into any part of the building, upstairs and down, by one person. Dirt is thoroughly filtered from the air by a double dust bag on **inside** of the sturdy steel tank. No bag on outside to get caught or torn on seats. Erasers are easily cleaned in the classroom by vacuum. Machine is excellent for cleaning draperies, shades, shelves, books, blackboard trays, etc. It insures many years of trouble-free service, since it is sturdily-built of finest materials.

FLOOR MACHINES—For Thorough, Speedy School Floor Maintenance

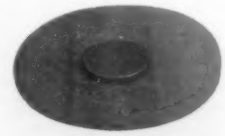
Appearance of your school building is much improved when floors are kept in good condition. Modern methods of school floor maintenance necessitate the use of an Electric Floor Machine. Kent Floor Machines, used for steel wooling, scrubbing, waxing, buffing and sanding various types of hard surface floors, are made in sizes to fit needs of your particular floor area. One of most popular sizes used in schools is the Model C15 illustrated below. This all-weight-on-brush machine combines the principles of the patented off-set motor design for perfect balance and ease of operation, straight-line drive for minimum number of moving parts, automobile gear construction, fully enclosed dust and water-proof motor, and adjustable handle equipped with safety-switch.

THE KENT REPUTATION

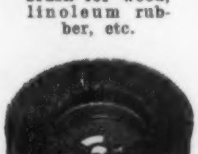
has been built upon the satisfaction of thousands of users in all types of buildings in all parts of the world. One famous university has more than 25 machines to take care of their needs (name on request). For over 28 years, KENTS have proved their quality by their performance.

Fibre scrubbing brush for wood, linoleum rubber, etc.

Write for illustrated circulars giving further details



Lamb's wool buffer for high lustre



Stiff polishing brush for buffing water base wax

Soft polishing brush for buffing turpentine base wax

Steel wire brush for scrubbing hard floors such as cement, etc.

GEERPRES WRINGER, INC.

Muskegon, Michigan

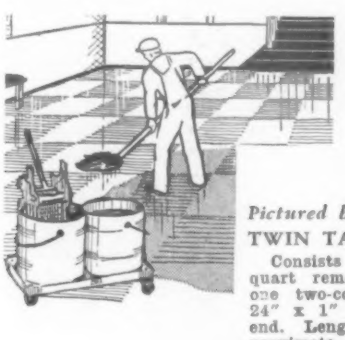
GEERPRES

MOP WRINGERS & TANKS

A GEERPRES
Floor Cleaning Unit

certainly does take the mess out of mopping! A single downward stroke of the lever, and the mop is wrung out and ready for use on the floor, enabling the school janitor to wash and rinse floors quickly and thoroughly.

The Floor Cleaning Unit consists of a long-lived GEERPRES Wringer, of the famous downward pressure type, making it splashless and safe. The Tank on its Chassis has ball bearing casters, with soft rubber wheels. This eliminates injury to your floor, with less noise in operation. This Unit is available in two sizes, with single or twin tank models.



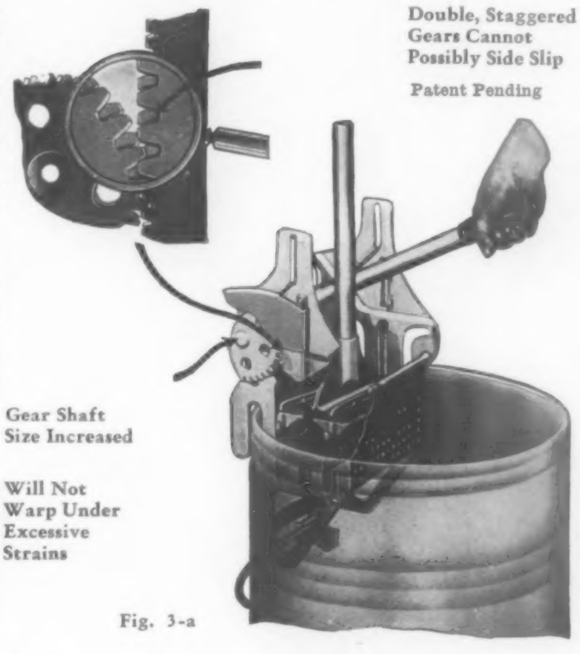


Fig. 3-a

Advantages

Long time service—no parts to crack or warp — no splash — no rust.

Will not mar or scratch floors.

Preserves mops in the best condition for rapid mopping.

Wrings quickly and uniformly, with no loose mop strings to catch around legs of chairs and tables. Force is exerted downward upon the mop, the natural way for the water to flow.

Simple in operation — a downward stroke of the lever extracts the water.

Fully guaranteed.

Pictured below—

TWIN TANK UNIT No. 1624T

Consists of one wringer, two 32-quart removable galvanized tanks, one two-compartment chassis with 24" x 1" rubber bumper on each end. Length 31". Width 17". Approximate weight 47 pounds. Wringer and chassis, cadmium plate and durable baked finish. A similar unit — No. 2436T — is made with larger tanks (44-quart), length 33", width 18", approximate weight 60 pounds. Wringers in all models have double-staggered gears which cannot possibly side-slip. All models have double ball-bearing casters and soft rubber wheels.

Below (center)

GEEPRES UNIT No. 2436

Consists of wringer for all sizes of mops from 20-ounce to 36-ounce, single tank and chassis. The Wringer has double-staggered, non-slipping gears; extra long handle with large rubber grips; cadmium plate and durable baked finish; electric arc welded construction. The wringer fits round or square containers. Weight 17 pounds. Width of wringer inside mop compartment, 7¼"; length inside, 9¼"; depth when open, 7¾". Height of complete unit to top of handle extended, 39".

Below (right)

GEEPRES UNIT No. 1624

Consists of wringer for mops from 14-ounce to 24-ounce. Fits round or square container. Has double-staggered, non-slip gears. Made of steel, fully guaranteed. Cadmium plate and durable baked finish. Width of wringer inside mop compartment 6"; length inside 8¼"; depth, open, 7½". Height of unit including wringer handle, 31". Tank capacity 32 quarts. Weight of complete outfit—wringer, tank and chassis—25 pounds.

THE MURALO COMPANY, INC.

Decorative Wall Coatings, Casein Paints, Calcimines, Texture Paints Water Paints, Wall Paints, Cement Paints, Wall Sizes and Patching Plasters

576 Richmond Terrace, Staten Island, N. Y.

Cambridge, Mass., 200 First Street
Chicago, Ill., 2624 W. Lake Street
Los Angeles, Calif., 4890 Pacific Blvd.
San Francisco, Calif., 447 Hampshire Street

NATION WIDE DISTRIBUTION

MURAL-TONE — A CASEIN WALL AND CEILING PAINT IN PASTE FORM

Mural-tone meets every decorating requirement—speed, beauty, economy, and durability. It is a high grade casein paint made according to a scientifically balanced formula. The principal pigments used are remarkable for their extraordinary opaqueness and brilliance. The clear, colorless, vehicle, compounded from casein, is characterized by toughness of film, strong adhesive qualities and non-yellowing properties—insuring clarity and permanence of color.

Once Mural-tone is applied the film remains in sound condition and at any future time it, or any other decorative material, can be applied without any treatment of surface.

Ideal for Unseasoned Plaster and Masonry

Mural-tone can be applied to fresh (not soaking wet) unseasoned plaster and masonry immediately after they have hardened (usually 48 hours), as it possesses the right degree of porosity to permit the escape of moisture and the free passage of air essential to the proper curing of the surfaces. All colors are permanently limeproof and alkaliproof. For *new* construction or *old* surfaces we believe there is no finer paint.

Mural-tone Exceeds Government Specifications

Mural-tone conforms to—in fact exceeds—the requirements for interior cold water paste paint set forth in Federal Specifications TT-P-23A, Type 2, issued by the U. S. Government.

Special Advantages

(1) Beauty—Rich, matte finish, clear in tone.

(2) Speed—Dries in less than an hour, permitting two-coat work, if necessary. Has no unpleasant paint odors.

(3) Economy—No costly thinners necessary. Permits savings in time and labor.

(4) Remarkable Opacity—One coat covers and hides on most surfaces.

(5) Exceptional Coverage—One gallon of paste thinned to brushing consistency will make 1½ gal. of paint, covering and hiding (depending upon surface conditions) as high as 1000 sq. ft., one coat, as shown by the following:

Smooth plaster	750 to 1000 sq. ft.
Oil or flat oil painted surface	750 to 1000 sq. ft.
Plaster board	450 to 600 sq. ft.
Rough concrete	300 sq. ft.
Brick	350 sq. ft.
Insulating board	250 sq. ft.

(6) Intense Whiteness—A brilliant white that will not yellow with age, and clear tints that will retain their color indefinitely. Exposure to strong light or darkness will not cause fading or graying. Acid fumes, vapor and heat will not affect it.

(7) High Light Reflective Value—Due to the high index of refraction of the pigments used in manufacture, in combination with clear, colorless casein vehicle, Mural-tone rates a high light reflective value—white averaging 90% plus.

(8) Cleansable—Water, a mild neutral soap and soft sponge are all that are necessary to clean the painted surface.

(9) Acoustical Surfaces—By actual scientific test, Mural-tone has proven to be an entirely satisfactory material for the decorating of acoustical plaster. For best results, Mural-tone must be sprayed on acoustical surfaces.

Colors

Color range includes a brilliant white, 10 beautiful tints, 17 Mural-tone Positive Colors and black. An endless variety of tints can be easily obtained by intermixing or tinting. Intermixing and tinting charts will be sent you on request.

Mural-tone Positive Colors—Finely ground, concentrated colors in casein vehicle, especially developed for tinting regular Mural-tone White and other casein-vehicle paste paints.

Positive Colors can also be used full strength, alone or intermixed, where strong, brilliant effects are desired. Because of their high tinting strength they are very economical. They produce clear tints of unusual brilliancy.

MURAL-TONE MASONRY PAINT

A Resin Paste Paint for Interior and Exterior Masonry Surfaces

Mural-tone Masonry Paint is designed for the decoration and protection of outside and inside masonry surfaces, particularly concrete, stucco, brick, stone and other similar surfaces. It possesses superior weathering qualities, high opacity and remarkably easy brushing and application. It may be applied to "green" concrete as well as directly to "green" plaster. It may also be applied over oil paint which is in good condition, and adhering firmly. Oil paint may be applied over Mural-tone Masonry Paint.

Mural-tone Masonry Paint may be applied over surfaces which have been painted with cement paint, provided that the cement paint is in good condition. Like other Muralo Products, it is prepared for use by simple and easy thinning with water (½ gal. to 1 gal. of paste), and of course involves no fire hazard. It dries to the touch in approximately one hour, and may be recoated the next day. Under reasonably good conditions, one coat is adequate although usually two coats are recommended.

You will at once recognize the versatility and usefulness of this remarkable paint; formulated and built to a standard and quality previously unknown in the Water Paint Field. Upon basis of performance, it is one of the most economical paints obtainable. It comes in 8 tints, and white; 6 tinting colors and black.

Coverage—One gallon of paste thinned to brushing consistency will make 1½ gal. of paint, covering and hiding (depending upon surface conditions) as high as 855 sq. ft., as shown by the following:

Oil primed plaster	855 sq. ft. (1 coat)	Stucco	370 sq. ft. (1 coat)
Brick	225 sq. ft. (2 coats)	Cement-asbestos siding	500 sq. ft. (1 coat)
Rough concrete	600 sq. ft. (1 coat)	Cement-asbestos siding	300 sq. ft. (2 coats)

SPACKLE SURFACING COMPOUND

Properly prepared surfaces mean perfect paint jobs that give lasting satisfaction. Spackle is an efficient repair material for filling cracks, holes, dents, joints, and rough grain, and for building up surface irregularities before painting and decorating interior surfaces. It dries quickly to a smooth, hard snow-white surface, sands easily and takes any decorative coating perfectly.

Spackle is packed in handy dry powder form and is made ready for immediate use by the admixture of water. Varnish, white lead or colors-in-oil may be added to make the old-fashioned Swedish Putty.

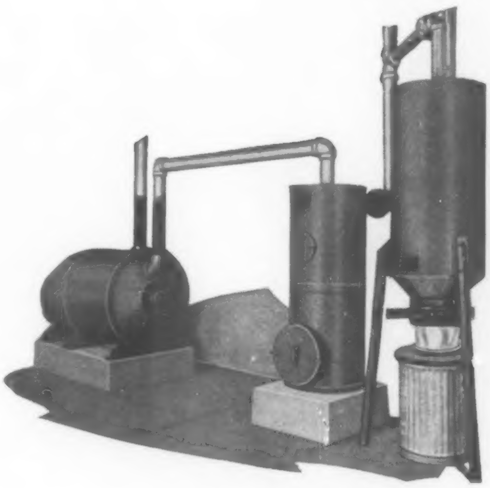
Quality

Muralo Process Paint Products have the benefit of a background of more than 40 years' experience specializing in the manufacture of high grade Water Paints and kindred products. This record of experience is reflected in the popularity of these paint products which enjoy a world-wide reputation for supreme quality.

For color cards and more complete information on Muralo Process Paint Products, write to **The Muralo Company,** 570 Richmond Terrace, Staten Island, N. Y.

THE SPENCER TURBINE COMPANY

Hartford, Connecticut



THE SPENCER CENTRAL VACUUM CLEANING SYSTEM

The Spencer Central Vacuum Cleaning System has met with the approval of architects and engineers everywhere, and has been installed in more than 10,000 buildings, including more than 1500 school buildings.

Spencer Central Vacuum Cleaning is a permanently installed system for the speedy and complete removal of dirt and dust from all kinds of floors, walls, ceilings, furniture and other building equipment. It consists of five essential parts, each carefully selected to meet the special requirements for each individual building:

1. A vacuum producer, located in the basement. 2. Inlet valves, conveniently located on all floors and piped to vacuum producer. 3. Specially designed, entirely enclosed, and easily cleaned separator. 4. Light weight, flexible hose. 5. Special vacuum tools for each operation.

Advantages—In exhaustive tests in leading schools, the powerful vacuum, scientifically applied with correct tools, has demonstrated its ability to remove more of the dirt in less time than other methods.

Because the equipment is simple in design, requiring little attention and because these systems are built to provide satisfactory service over long terms of years, both the operating and amortization costs are extremely low.

One janitor can clean twelve average sized class rooms in two hours with a 3 HP Spencer System. The Spencer elbow joint makes cleaning around furniture easy.

For Cleaning Erasers and Chalk Trays—Spencer Vacuum Cleaning, instead of scattering the great bulk of the chalk dust on the floor, provides a method of cleaning erasers and chalk trays that is rapid, sanitary, easy and thorough. The janitor has only to attach a special tool and move it across the surface of eraser or chalk tray.

Cleans the Boiler Room—Spencer Vacuum cleans boiler room floors—removes dust and soot from pipes and draws soot out of the boiler tubes, often saving the whole cost of operation in this one item alone.

Swimming Pool Cleaning Equipment—By means of special cleaning tools usually employed in connection with the pump on the filtering system, it is possible to remove accumulated sediment from swimming pools without the waste of water involved in draining the pool. Bulletin on request.

SPENCER PORTABLE VACUUM CLEANERS

The Spencer 1/3 HP Portable Vacuum Cleaner shown above weighs only 34 pounds. The 3/4 HP unit shown below weighs 150 pounds. Both are built on the same principles of design as the larger Spencer units, and use the same vacuum tools. Easy to clean, easy to use, and built for long life service.

ALLAN J. COLEMAN

Manufacturers of Sewer, Pipe, Closet and Drain Cleaning Tools

120 W. Illinois St., Chicago, Ill.

Flexible Closet Cleaners

COIL WIRE CLOSET CLEANER

Instantly removes obstructions from water closets, drain pipes, etc.

Grade A

C-510-515. Flexible Coil made of a special prepared **Swedish Spring Steel Music Wire** No. 12 gauge, ½" size, with removable corkscrew and cone wire.

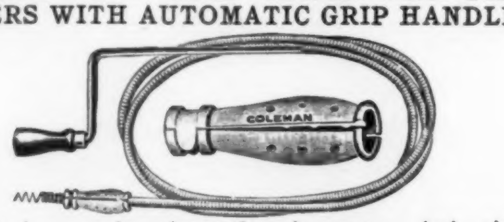
C-510—3-ft. Music Steel Wire Spring $4.50
C-515—6-ft. Music Steel Wire Spring 5.50

Grade B

Made of good oil-tempered steel, 12-gauge wire ½-in. size.

C-516—3-ft. coil, black enameled... $3.50
C-517—6-ft. coil, black enameled... 4.50

FLEXIBLE COIL WIRE SEWER AND PIPE AUGERS WITH AUTOMATIC GRIP HANDLE



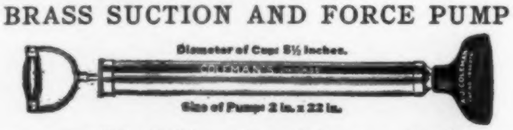
For use in removing obstructions in vacuum, drain pipes or sewers. Made of the best oil-tempered spring steel, and are flexible, enabling them to turn bends and go through traps. Made with cork-screw and handle complete, also furnished with automatic grip handle.

Style No.	Size, Ins.	6-Ft. Lgth.	9-Ft. Lgth.	15-Ft. Lgth.	25-Ft. Lgth.	50-Ft. Lgth.	100-Ft. Lgth.
C-520a	3/16"		$1.25		$2.25	$3.80	$6.80
C-520b	¼"		1.55		2.70	4.25	7.65
C-520	⅜"	$2.00	2.70	$4.50	6.75	10.20	17.00
C-525	½"	2.25	2.90	4.95	7.20	12.75	21.25
C-528	⅝"			5.85	8.10	13.60	25.50

		Price
C-530—¾",	10-ft. sec., hdl. and corkscrew	$5.50
	Extra 10-foot section	5.00
C-535—1",	10-ft. sec., hdl. and corkscrew	6.50
	Extra 10-foot section	6.00

Nos. 530 and 535 are furnished with handles and corkscrews and all connections. Made in 10-foot sections.

BRASS SUCTION AND FORCE PUMP

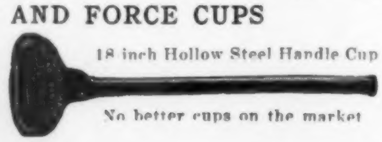


Large reversible Rubber Cup. Fits any opening up to 5 inches. Wonderful article for opening sinks and drains.

C-500—Pump with Cup. Weight, 6 lbs. ....Each $12.00
C-505—Cup only. Weight, 1 lb. ....Each 1.50
C-508—Graphite packing rings ....Per set 1.50

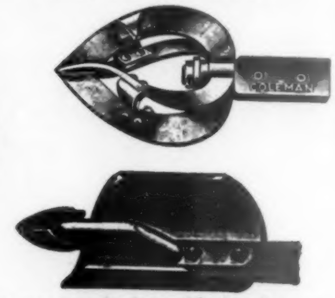
SUCTION AND FORCE CUPS

High grade rubber. All handles secured to Cup by threads and sockets.



Style No.	Size, Ins.	Color	Wood Handles, Ins.	Price Per Doz.
C-545	5½	Red	Steel 18	$24.00
C-550	5½	Red	Cup Only	18.00
C-555	5½	Red	Wood 30	15.00
C-560	5½	Black	Wood 30	12.00
C-565	4½	Red	Wood 30	9.00
C-570	4½	Black	Wood 30	7.80

Giant Revolving Sewer Cleaning Spear Points and Root Cutters



For cleaning out straight sewers or drains. Made of a special oil-tempered, flat spring, steel wire. Equipped with spear point, roller ball and grip handles, which increases efficiency. Use either end.

Style No.	Size, Ins.	25-Ft. Length, Each	50-Ft. Length, Each	*75-Ft. Length, Each	*100-Ft. Length, Each
C-532	⅛ x .030	$1.25	$1.75	$2.50	$3.50
C-534	3/16 x .030	1.50	2.50	3.50	4.50
C-536	¼ x 1/16	1.85	3.50	5.00	7.00
C-537	½ x 1/16	2.40	4.50	6.00	8.00
C-538	¾ x 1/16	4.00	6.00	8.00	10.00
C-539	¾ x ⅛	6.00	8.40	12.00	16.00
C-539a	1 x ⅛	7.00	10.20	13.80	18.90
C-540	1¼ x ⅛	7.20	10.80	14.40	20.00
C-542	1½ x ⅛	8.40	12.00	18.00	24.00

* Furnished with Frame. Other lengths, 75 cents extra.

CONDUITS AND SEWER RODS WITH NEW FRICTIONLESS COUPLING

C-543—COLEMAN'S SECTIONAL SEWER AND CONDUIT RODS are made of the best grade of 1⅛" hickory, 3 ft. or 4 ft. lengths, coupled together with Coleman's latest Most Improved "FRICTIONLESS" 1⅛" Certified Malleable Iron Couplings.

Experience has taught us that there is a great amount of friction and drag caused by the Couplings and Rod dragging flat on Pipe.

Repeated tests have caused the development of COLEMAN'S "FRICTIONLESS" COUPLING. Rods touch on four wings or planes on our Improved "FRICTIONLESS" Coupling eliminating this friction and drag to a minimum.

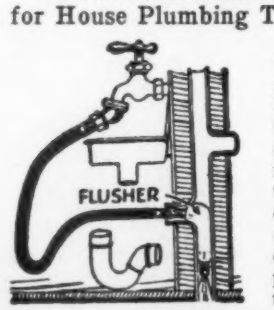
A Heavy Duty Sewer Rod

C-543—Rod with couplings 1⅛" x 3', wt., 2 lbs............ $1.10
C-543a—Rod with couplings 1⅛" x 4', wt., 2¾ lbs............ 1.20
C-625—Rod with couplings ⅞" x 3', wt., 1½ lbs............ .90
C-675—Rod with couplings ⅞" x 4', wt., 1¾ lbs............ 1.00

Tools for Above Rods. Write for Prices

HYDRAULIC FLUSHER

House Faucet Connection. Standard Size of Flusher for House Plumbing That Gives Results.



This Sewer Flusher is made of several plies of water-tight heavy rubberized fabric which makes it Strong, Durable and Flexible, easy to insert into traps, vents, curved sewer drains or pipes. A very efficient article when it is necessary to wash out pipes or sewers. When connected with strong water pressure, flusher is expanded to size of drain, thereby giving a direct water pressure close to stoppage. Sizes to fit all pipes. Write for prices.

"GUARD HEALTH" By Using COLEMAN'S Tools to Keep Sewer Drains Running Freely and Have Sanitary Buildings

SECTION V

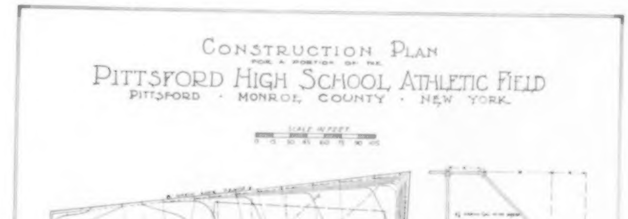
SITE PLANNING—GROUNDS MAINTENANCE

PLANNING AND PLANTING SCHOOL GROUNDS OF MODERATE SIZE

By Francis Hastings Gott

Francis Hastings Gott Associates, Landscape Architects, Rochester, N. Y.

PRESENT-DAY educational institutions show marked improvements over the schools of yesterday. Among these may be mentioned the architecture of school buildings, the heating, lighting, ventilation and equipment of the rooms, and the provision made for the physical development and outdoor exercise of the pupils. Not so long ago children were sent to school solely to develop their minds. Little if any thought was given to their play or to their bodily welfare. If considered at all, it was assumed that walking to and from school, play at recess and during the noon hour, afforded ample exercise. Perhaps in days gone by this assumption was true, for goodly numbers in generations past grew up, took their places in the world and lived to ripe old age.



Minimum area developed for maximum use, with the knowledge that future land acquisition would be essential

Play Space Essential

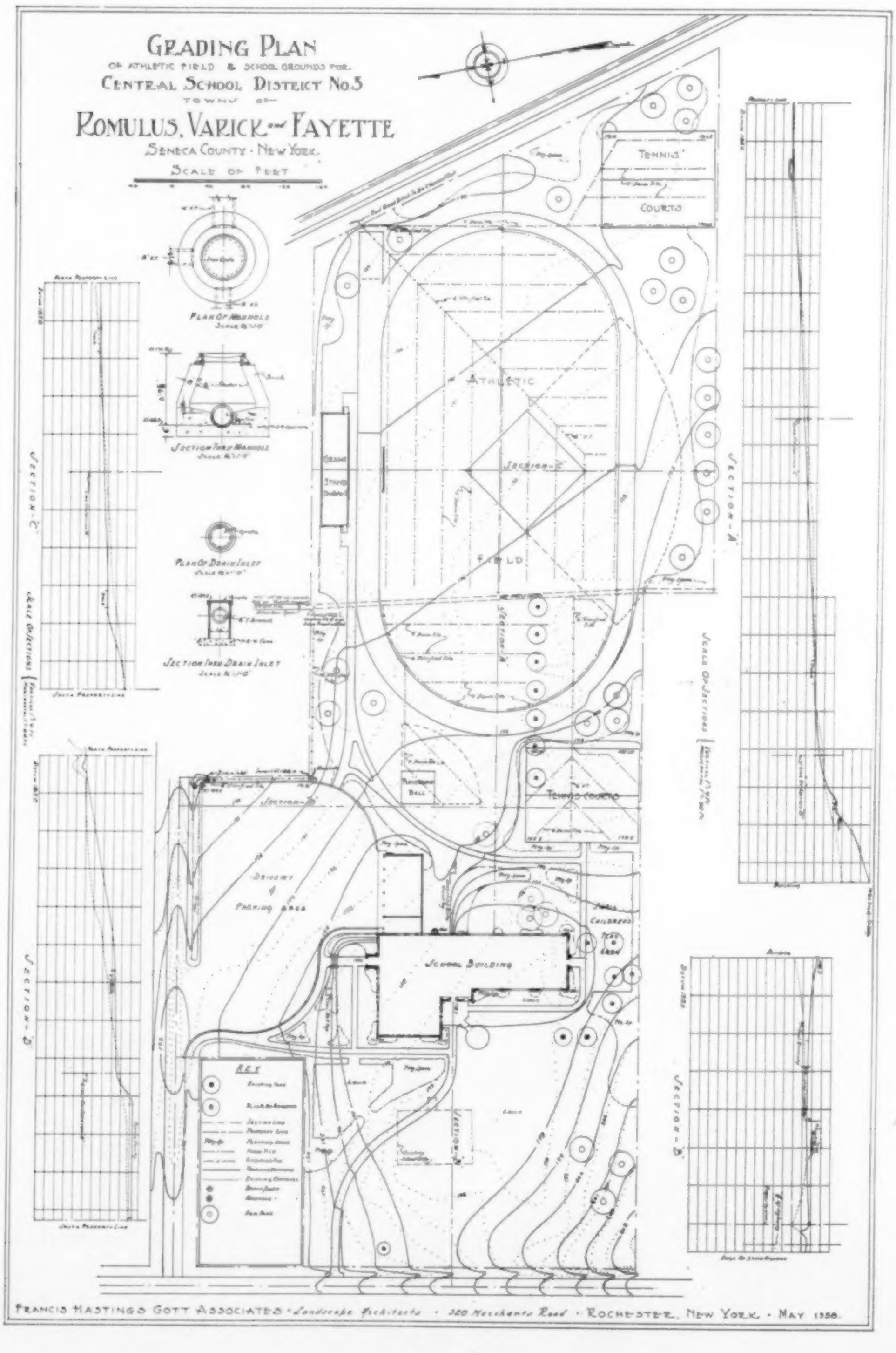
Nowadays, however, children do not walk one, two or more miles to school. The automobile and the school bus have deprived them of this healthful exercise. Likewise, their increased numbers have made impromptu games less practical. Such changes, together with increased knowledge covering the bodily needs of growing children, have brought about the development of organized physical education. It is evident that in order to play out-of-doors games, the most essential factor, next to the players themselves, is space on which to play. In the past, many schools were sadly deficient in the amount of play area per pupil. In recent years this condition has been partially corrected, and it is now in process of being generally remedied. School boards, realizing the need of space where new schools were in question, have in many cases acquired sufficient acreage to meet their present and estimated future requirements. Established schools, realizing their deficiencies, have faced expansion problems often requiring the purchase of considerable additional land. Along with the acquisition of these larger areas has come the problem of their efficient development.

Difficulties of Design

The design and construction of play areas often involve unexpected problems. The difficulties, strange though it may seem, increase inversely with the

size of the property. The smaller school grounds, like those being considered in this article, are not the simple problems they appear; in fact, the smaller the area, the greater is the strain placed upon the ingenuity of the designer. Where ample land of suitable character is available, play areas may be placed so as to take advantage of existing ground levels and may be separated sufficiently to make an absolutely formal design unnecessary. On areas of limited size, however, the designer has little leeway and is often forced to make radical changes in the contour of the land. This process often involves the moving of quantities of earth, which at best is expensive. Moreover, small fields offer little opportunity for the planting of trees and shrubs, which are essential to appearance and of practical value as screen and windbreak, and repellent to noise and dirt. Furthermore, insufficient space involves difficulties in the management of groups of children of different ages and sex and, where the fields overlap, causes inconvenience and even danger.

To a designer studying the development of school property, the location, orientation, drainage and surface of play areas are the first considerations. Beautification of grounds around the building and in the spaces outside the play areas, though vitally important from an esthetic viewpoint, is nevertheless a secondary condition. Only where room is available can trees and shrubs be used advantageously to beautify and protect the large, open, angular play areas.



A heavily used area with little space for segregation by sex and age

The Landscape Architect's Report

Many and unexpected are the problems that arise to bother the school board, faced with a program of expansion. Technical advice from a trained source is needed. A landscape architect employed before any definite steps are taken will save the board members many a worry and may be the means of saving many a dollar for the taxpayers of the district.

Myron Jordan, Architect, Richfield Springs, N. Y.

Preservation of existing trees add greatly to the attractiveness of the landscaping of the Richfield Springs (N. Y.) School

Carl Ade, Architect, Rochester, N. Y.

The existing trees on the spacious lawn in front of the Ovid (N. Y.) Central School are grouped in too straight a line

This holds true whether the contemplated expansion is large or small, whether it involves an entirely new site or merely an addition to the old school grounds. The most satisfactory procedure is to have the landscape architect study the pros and cons, advantages and disadvantages of any site under consideration and, when the study has been completed, furnish to the school board a report of his findings.

Such a report will provide a clear picture of the problem and will answer the following and probably many other questions:

1. Location

Is the area easily accessible? Has it good surroundings? Is it protected by zoning regulations against future changes? Has it a good water supply, pleasing views and natural wind protection?

2. Size

Is the area sufficiently large for present and estimated future needs? If necessary, can adjoining land be secured?

3. Topography

Will the area lend itself to playground development without undue expense for grading?

4. Soil

Is the soil capable of supporting sturdy plant life?

Answers to these questions and others of local importance will help the board to arrive at a wise decision regarding the merits of the proposed purchase. This method of procedure is advisable irrespective of the size of the tract; in fact, more serious difficulties with far less chance of satisfactory correction can arise on small areas than on those that are really extensive.

This report by the landscape architect is the first of many ways in which he will prove useful in the development of a perfected plan. In collaboration with the architect he will study the location and elevation of the buildings and their relation to the roads, courts and turf areas. It is now common knowledge that only by such collaboration between men trained in their respective fields will the best possible results be secured. When the building is ready for occupancy, the architect's work is done. In this he differs from the landscape architect, who might well be retained as a consultant, for changes and additions out-of-doors are inevitable. Moreover, with use play areas develop ailments, and those who care for turf and planting areas require technical advice and supervision. So it would not be amiss for a school organization to retain a landscape architect permanently in an advisory capacity.

Using Play Space to Best Advantage

Ideal conditions of ample room and naturally level, well-drained land for play purposes unfortunately are not always found. Suitable and accessible areas may not be available. Funds may be lacking for the purchase of sufficient acreage, and often, for one reason or another, the area purchased is far from perfect. Under such conditions it then becomes the duty of the designer to use his skill to overcome the undesirable features and to create so far as possible a well-ordered, pleasing arrangement. Crowded for space or hampered by excessive slopes, he may be forced to do things not in accordance with his best judgment. When all else fails, he may find it necessary to crowd and to combine certain play fields.

Football and baseball are played at different seasons, and so can be played successfully on the same area. Soft-ball courts may, if need arises, be allowed to overlap the outfield of the main baseball diamond. A covered backstop behind the home plate of the baseball diamond will save a lot of room. If provided with removable posts, hard-surfaced areas may be used alternately for tennis, basketball and other games and then can be flooded in cold weather to provide skating and hockey.

At times every foot of added space means a lot. Occasionally a few feet of additional space may be

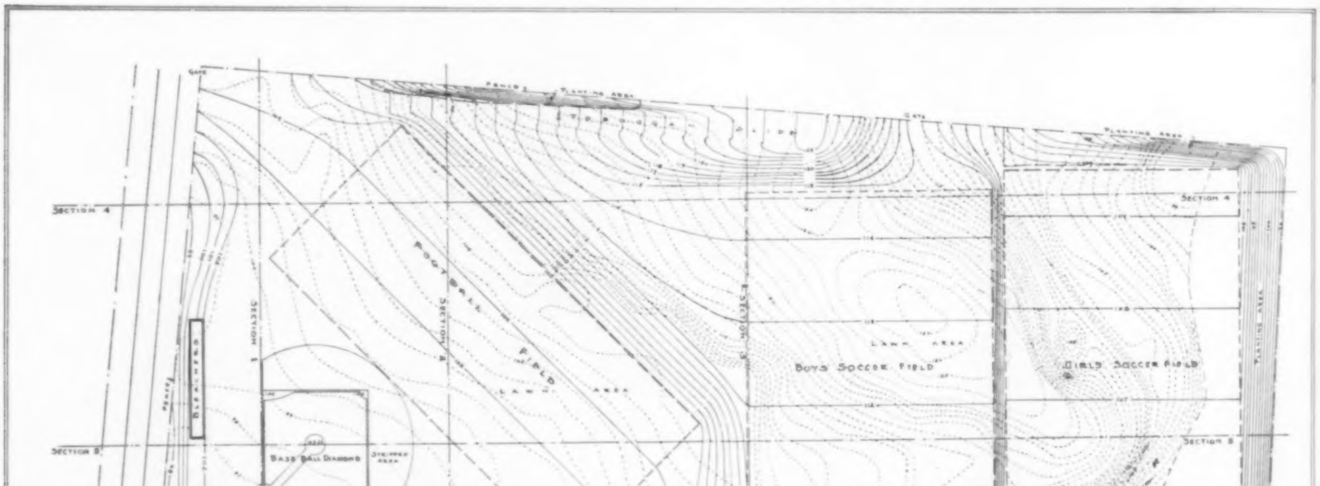
gained by the use of walls in place of terraces. Grandstands may be constructed with sloping bases, thus making use of the terraced slopes; buildings may be used as backstops if the windows are screened, and, as a last means of saving space, shrubbery planting may be omitted and its place taken by vines on buildings and fences.

Naturally, this crowding, combining and overlapping is most undesirable, and to be resorted to only in extremities. Definite objections to these makeshift measures are the need of regulating the time of play, the constant wear on turf areas, and the danger of injury, should players collide.

Nature of the Play Surface

Occasionally a site is acquired which, though ample in size, offers many difficulties of development for playground use. It may consist of humps and hollows, or slope steeply all in one direction; it may be wet and swampy, or of the consistency of a gravel-pit or a sand dune; or it may be as full of springs as a sieve is of holes. These are not imaginary conditions—they really happen. Areas of uneven surface, be they hilly or sloping, must necessarily be leveled to become fit for playground use. It seems unfortunate that none of our present sports can be played on anything but level areas. In some instances large sums of money could be saved if some smart person would concoct a few games suitable for school use to be played on hilly or sloping areas.

We who live in this sophisticated age all know that things are not always what they seem. This is also true of play areas. Level fields may not be strictly level; in fact, a slight slope is desirable on



This project provides sufficient room for separate play areas for boys and girls, with graded slopes between the fields

Leon Stern, Architect, Rochester, N. Y.

Allen's Creek School, Brighton, N. Y. Much grading was required to produce a pleasing effect of harmony between building and grounds

all play areas. There is no definite rule as to the amount of slope permissible, but wherever possible, the pitch should be sufficient for surface drainage, insufficient to annoy the players, and what there is of it should be at right angles to the line of play. Even a quite decided pitch is often hardly noticeable. I once discovered a difference of 8 feet in elevation between goal-posts of a football field. To me this seemed an excessive amount of pitch, and I feel confident that in this any team struggling toward the upper goal would agree. The area between fields may be level, or sloping with varying degrees of steepness up to the angle of repose of the soil. Any increased slope in excess of this point of course necessitates a wall, and a wall on a play field, unless protected, is something to fall over. Therefore, for safety's sake, it is advisable to place a fence, hedge or mass planting as protection at the top of all walls.

Choice and Design of Plantings

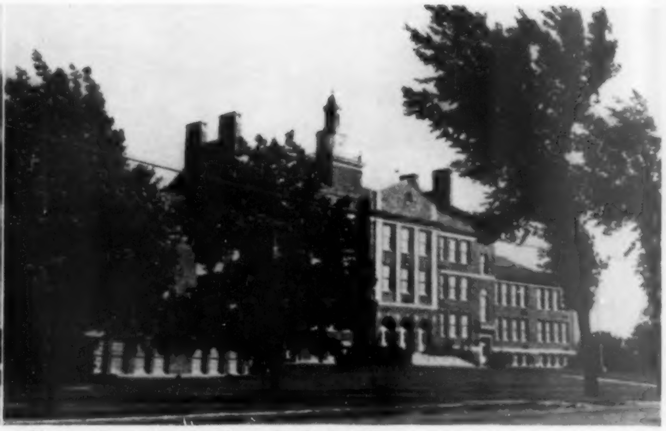
Plant material, with the exception of grass, is of course out of place on play areas, which must be treeless, shrubless expanses of turf. Trees, shrubs and vines add greatly to the appearance of the grounds and may be used anywhere except on or in too close proximity to the play fields. Over-planting of school grounds, with secluded walks and hidden lawn areas, is far from desirable. Those who have brought up children through the amorous 'teens will realize the objection to this practice. Suitable shrubs or low growing evergreens, used as foundation planting around the building, are most attractive. Masses of tall shrubs may be used effectively as border planting, with the lower-growing varieties used on the grounds themselves. Trees, placed to frame the building and to create pleasant, shaded lawn areas, add to the beauty and comfort of the grounds. In my opinion, trees should be used more extensively than shrubs on school grounds except where an eye-high screen is desired.

It is always difficult to maintain sod on terraces or steep slopes. Deep-rooted, tenaceous ground-cover plants solve this difficulty and will cover the bank and require no further attention. If it is desired to stop boys and girls from running over the terraces, it can be done effectively by planting native roses and other thorny plants. Even the toughest of the big boys will seldom make more than one experimental short-cut over planting of this kind. Should he repeat the experience, he's either really tough or a case for the psychiatrist.

Wind, with the dust and smoke that it carries, is most objectionable on the play field. These, as well as noise from passing traffic, may be effectively subdued by a screen-planting of trees and shrubs. Thus it is clear that planting has a definitely practical as well as an esthetic value in school-ground development.

Plants best adapted for school-ground use are those that are hardy, tough and able to withstand neglect. It is a mistake to use rare or tender plants on school grounds, for the care that they receive is usually limited and they are often subjected to downright abuse. Therefore, in addition to being chosen for their adaptability to conditions of soil and location, they must also be selected because of their tenacity and ability to exist under trying conditions.

Plants which produce bright, showy flowers, edible or pickable fruit are a temptation to children. Bright flowers and berries are too attractive, and snowberries make such wonderful ammunition. In choosing plants for use on the school grounds, therefore, it is wiser



Charles Carpenter, Architect, Rochester, N. Y.

Existing and new planting make a pleasing setting for the Brighton (N. Y.) Free School No. 1.

to avoid such varieties and use sedate plants whose principal attraction is their foliage. Here, again, the wise choice of plant material is of far greater importance on the small grounds than on those of greater extent, where the plants may be seen only occasionally or at a distance. On small grounds, to the contrary, every plant is seen every day by everybody.

Maintenance of Grounds and Play Areas

After the construction period is past, there comes the task of maintaining and improving the grounds and play areas. This is a real problem. Play fields are subjected to very hard use. Particularly is this true on the smaller fields where the use is concentrated and where the same area is played on in both spring and fall.

Even the most uninitiated know that new seedings must not be used until the grass is well established. Even established turf areas, however, are not always in condition to be used. If they are to be kept in good condition, judgment must be used and play prohibited when the ground is soft or when the grass is suffering severely because of lack of moisture.

Turf areas that are subjected to hard use require continual and expert attention. Even the most energetic of janitors cannot be in two places at once; and if he lets his inside work go, to attend to the outside, he's quite likely to hear about it. It is therefore advisable to allot sufficient funds to make possible the hiring of extra help to be used entirely out-of-doors. These funds should also be sufficient to provide for tools, materials and intelligent supervision. Provisions must be made for watering, feeding, reseeding, mowing and weeding grass areas, and for the cultivation, feeding and pruning of other plantings.

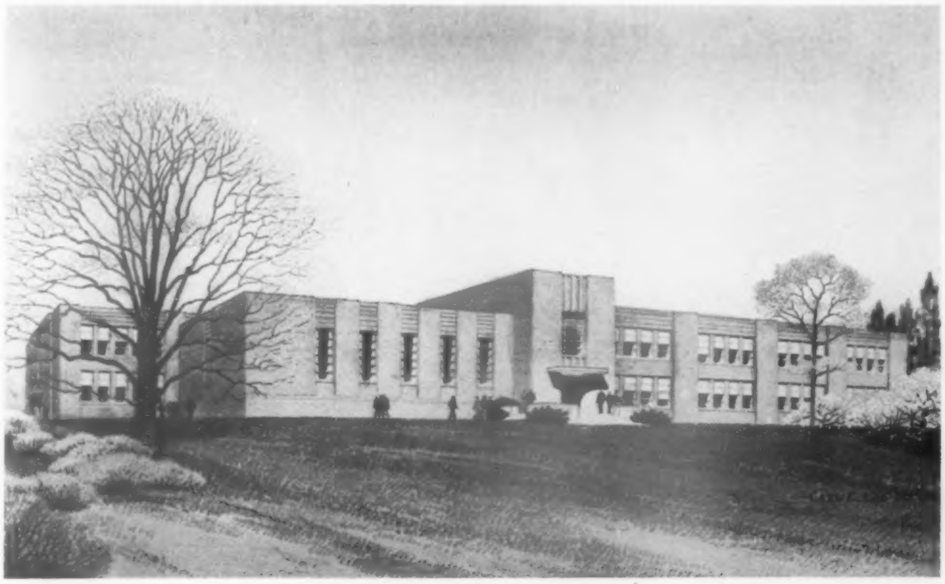
Water, essential if turf areas are to remain green in hot, dry weather, may be supplied by movable surface sprinklers or by a system of underground pipes with fixed sprinkler jets. During the last few years great advances have been made in sprinkling devices, and it is now possible to purchase substantial, durable and efficient equipment. Union Free School No. 1, Brighton, N. Y., applied daily throughout the summer some 36,000 gallons of water by means of surface sprays, and the lawn and turf play areas are something to be proud of.

Turf areas exhaust the available food in the soil and must be fertilized. This should be done regularly and systematically. Trees, shrubs and vines which do not receive the wear and tear of the turf areas require less attention, but nevertheless they do need regular cultivation, feeding and annual pruning. Good pruning is a job requiring skill and a knowledge of the plant material at hand. Sad to relate, what the shrubs receive in many places is more akin to butchery than to scientific pruning.

This regular maintenance of the grounds should be augmented by a program of education carried on within the school itself. The children should be taught that they are the ones who reap the benefits of well-kept play fields and should be shown how to care for and improve the school property. They should be taught what and what not to do, and should be encouraged both at home and in school to take pride in their school buildings and grounds. After all, the schools are theirs. They are now enjoying the use of them, and in the not very distant future will

be the ones who will have to spend money to maintain the schools for the use of their own children.

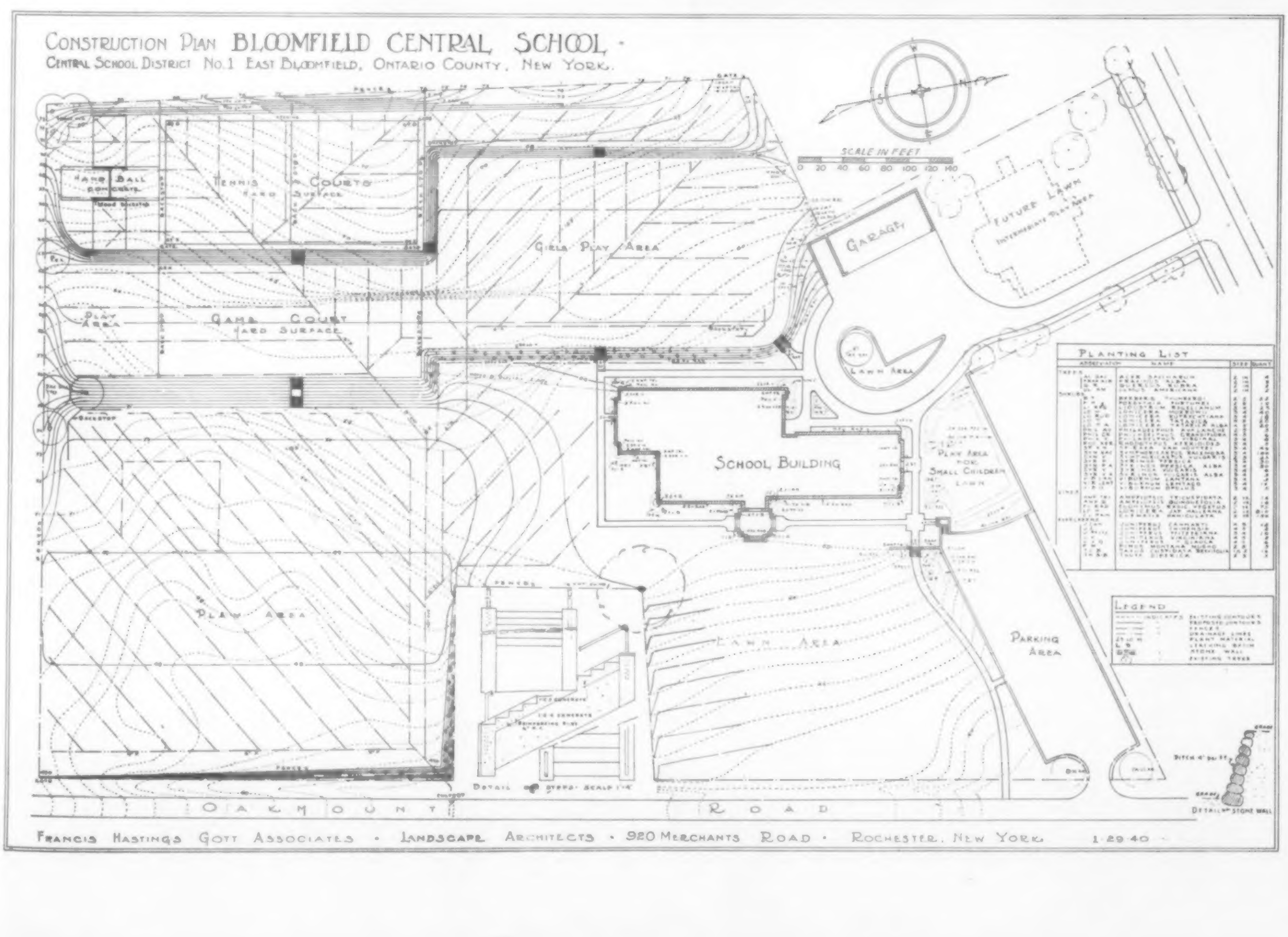
The accompanying plans show the difficulties encountered when the area is of insufficient size or when the land is so sloping that an excessive amount of grading becomes necessary. In the cases of the Gorham, Bloomfield and Pittsford schools, additional land was acquired to make possible even the plans shown. In each case, however, the area is the minimum rather than the ideal. The Pittsford field is inadequate, but the value of the surrounding land makes further expansion in this location prohibitive. This is a typical example of many of the older schools which failed to acquire land when it was available at reasonable prices, and are now cramped for space. Under such conditions the best solution, though by



Right—The architect's rendering of the Bloomfield Central School, East Bloomfield, N. Y., shows the large existing trees and the conception of plant grouping

Carl Ade, Architect, Rochester, N. Y.

Below — Play fields carefully fitted together to give maximum use of grounds. Radical grading was necessary



Dryer & Dryer, Architects, Rochester, N. Y.

Existing grades were artistically used at the Brockport (N. Y.) Central School

Carl Ade, Architect, Rochester, N. Y.

A simple treatment of the terrace at the Port Byron (N. Y.) Central School

no means perfect, is a play field located elsewhere, preferably as near the school buildings as possible.

Words of Advice

We all love to give advice. It has always been cheap, and as yet has not been affected by the upward price trend. Moreover, giving advice is a pleasant task. Therefore, I will devote some space to advice to School Boards, Architects, Landscape Architects, Superintendents, Teachers, the Younger Generation, and Whom Ever Else It May Concern.

1. Advice to School Boards:

a. The healthy development of our children is of utmost importance. Space on which they may play is a vital necessity. Do not fail, therefore, to provide sufficient land for present and estimated future needs. This should never be less than five acres, better ten, twenty or even more.

b. Employ a competent landscape architect before any site is purchased or any work started.

c. Get a definite report on each contemplated site covering the following points: size, location, topography, zoning restrictions, accessibility, protection from wind, views, soil, etc.

d. Allow 10 per cent of the cost of the building for the development of outside play areas.

2. Advice to Architects:

a. Do not plunge into the design of a school building without consulting and collaborating with the landscape architect.

b. Work with the landscape architect in regard to the design, arrangement, location and elevation of all school buildings.

c. Collaborate with him on the arrangement of roads, walks, play areas and all other features outside the walls of the building.

3. Advice to Landscape Architects:

a. Make your services available at reasonable rates to educational institutions. Your training and experience will help them as well as untold future generations.

b. Work and collaborate with the architect in every way possible.

c. Be practical first. Add beauty wherever possible.

d. Use tough, hardy plant material.

4. Advice to Superintendents and Teachers:

a. Maintain that which has been made for those under your control. See that turf and planting areas are kept in good condition.

b. Teach the children to do their part toward maintaining the grounds.

c. Use your authority to prevent use of turf areas when soil or weather conditions are unfavorable.

5. Fatherly Advice to the Young:

The schools and school grounds that you are privileged to attend and enjoy are the best in the world. The taxpayers of the district have built these schools for your use, benefit and enjoyment. It is therefore up to you to do whatever you can to keep the school and the school grounds in good order. Learn in them, play on them, and use them, but take care of them so that future generations may have as good as or even better than you now are privileged to enjoy.

The development of small school grounds offers little in glory or monetary gain. Their planning is often a difficult and unappreciated task. Their maintenance is attended with many difficulties, but the satisfaction of knowing that one has done his best to make the youngsters happy and to provide them with the best possible means of developing strong, healthy bodies should be sufficient reward.

LANDSCAPE ARCHITECTS FOR UNIVERSITY AND SCHOOL PROJECTS

The following directory is restricted to Landscape Architects who are in independent professional practice and have actually been identified with a number of university or school projects.

Space limitations permit only three listings for each individual or firm, and preclude mentioning either the name of the architect associated or the definite character of the work undertaken for each institution. It is believed that the majority of landscape architects specializing in school and university work are here represented, and that many of the projects listed have had a considerable influence on high-grade professional practice in the planning and planting of school grounds and college campuses throughout the United States.

CALIFORNIA

R. D. Van Alstine, 410 E. 9 St., Long Beach
James A. Garfield Classroom Building, Long Beach

Katherine Bashford & Fred Barlow, Jr., Architects Bldg., Los Angeles
Central Junior High School, Los Angeles
Harbor Hills, Palos Verdes
Ramona Gardens, Los Angeles

Ralph D. Cornell, 3723 Wilshire Blvd., Los Angeles
Pomona College, Claremont
University of California at Los Angeles
Santa Monica Junior College

George Gibbs, Palos Verdes Estates, Los Angeles County
Palos Verdes School Grounds

John William Gregg, University of California, Berkeley
Campus development for the University of California at Berkeley and Los Angeles, Mills College, Oakland

Edward Huntsman-Trout, 450 N. Beverly Drive, Beverly Hills
Scripps College, Claremont
Arrowhead Hot Springs, Arrowhead Springs

E. Leslie Kiler, 1184 Palo Alto Ave., Palo Alto
Stanford University, Stanford University
Palo Alto Community Center, Palo Alto
Frost Amphitheater, Stanford University

Butler S. Sturtevant, 210 Post St., San Francisco
University of Washington, Seattle, Wash.
Principia College, Elsah, Ill.
Principia School, St. Louis, Mo.

COLORADO

S. R. DeBoer, 515 E. Iliff Ave., Denver
Arapahoe County School Studies, Littleton
Colorado Home for Dependent Children, Denver
Boulder High School, Boulder

Irvin J. McCrary, 1608 Broadway, Denver
Gunnison High School, Gunnison
University of Colorado, Boulder
State Home for Mental Defectives, Ridge

CONNECTICUT

Currier-Enerson-Hoffmann, 967 Farmington Ave., West Hartford
Parking Area for Palmer Auditorium, Connecticut College, New London
Faculty Group, Connecticut College, New London
Palmer Library, Connecticut College, New London

Thomas H. Desmond, Inc., Office of, 1 Drake Hill Rd., Simsbury
U. S. Coast Guard Academy, New London
University of Connecticut, Storrs
Simsbury High School, Simsbury

FLORIDA

Herbert L. Flint, Post Office Bldg., Winter Park
Junior College, St. Petersburg
Veterans Home, Bay Pines
Carpenters Home, Lakeland

ILLINOIS

Robert Bruce Harris, 664 North Michigan Ave., Chicago
Marshfield Senior High School, Marshfield, Wis.
Niles Township Community High School, Skokie
School District No. 69, Cook County

Chance S. Hill, 1333 Maple Ave., Downers Grove
Ill. Normal University, Normal
Blackburn College, Carlinville
Northern Illinois State Teachers College, DeKalb

Simonds, West & Blair, 1101 Buena Ave., Chicago
Monticello College, Alton
Chicago Latin School, Chicago
Blackburn College, Carlinville

F. A. Cushing Smith & Associates, 333 North Michigan Ave., Chicago
Board of Education, High School Athletic Field, Marquette, Mich.
Community Recreation Center, High School Athletic Field, Ishpeming, Mich.
St. Agnes School, Albany, N. Y.

IOWA

P. H. Elwood, Ames
St. Amelian's School, Milwaukee, Wis.
Iowa State College, Ames
Iowa State University, Iowa City

LOUISIANA

William S. Wiedorn, 1305 Jackson Ave., New Orleans
Tulane University, New Orleans
John McNeese Junior College, Lake Charles
Terrebonne Parish High School and Athletic Field, Houma

MAINE

Beatrix Farrand, Reef Point, Bar Harbor
Yale University, New Haven, Conn.
Princeton University, Princeton, N. J.
Chicago University, Chicago, Ill.

MARYLAND

Joseph C. Gardner, 7110 Clarendon Rd., Bethesda
Woodrow Wilson High School, Washington, D. C.
Ellen Wilson Low-cost homes, Washington, D. C.
Lisner Home for Aged Women, Washington, D. C.

Irving W. Payne, 4017 Leland St., Chevy Chase
Georgetown Preparatory School, Garrett Park
The Miss Madeira School for Girls, Greenway, Va.
Lanham Grade School, Lanham

Office of H. Clay Primrose, 10 W. Chase St., Baltimore
Goucher College, Baltimore
St. Charles College, Baltimore
Woodstock College, Baltimore

MASSACHUSETTS

Robert Washburn Beal, 185 Devonshire St., Boston
Eldon Keith Field, High School, Brockton
Bowdoin College, Bowdoin Athletic Field, Brunswick, Maine
Wellesley High School & Hunnewell Playground, Wellesley

Herbert J. Kellaway, 12 West St., Boston
Uxbridge Field, adjoining High School, Uxbridge
Middlebury College, Middlebury, Vt.
Bread Loaf English School, Middlebury, Vt.

Warren H. Manning Associates, College House Offices, Cambridge
Randolph Macon College, Lynchburg, Va.
Cornell University, Ithaca, N. Y.
Phineas Lawrence School, Waltham, Mass.

Hallam L. Movius, 115 Newbury St., Boston
Bradford Junior College, Bradford
Bowdoin College, Brunswick, Me.
Tilton Academy, Tilton, N. H.

John Nolen, Office of, Harvard Square, Cambridge
Babson Institute, Wellesley
Queens College, Charlotte, N. C.
University of Wisconsin, Madison, Wis.

Olmsted Brothers, 99 Warren St., Brookline
Grove City College, Grove City, Pa.
St. Joseph's College, West Hartford, Conn.
Indiana University, Bloomington, Ind.

Bremer W. Pond, 5 Boylston St., Cambridge
Colby Junior College, New London, N. H.
University of New Hampshire, Durham, N. H.
Southern Methodist University, Dallas, Texas

Harris H. Purdy, Concord Road, South Lincoln
Radcliffe College, Cambridge
Tufts College, Medford

Arthur A. and Sidney N. Shurcliff, 11 Beacon St., Boston
Amherst College, Amherst
Mount Holyoke College, So. Hadley
Groton School, Groton

Bradford Williams, 9 Park St., Boston
Warrenton Country School, Warrenton, Va.

MICHIGAN

T. Glenn Phillips, Charlevoix Bldg., Detroit
Michigan State College, East Lansing
Horace H. Rackham, Educational Memorial, Detroit
Charles Housing Project, Detroit

H. O. Whittemore, 1920 Norway Rd., Ann Arbor
Ann Arbor Public Schools
Nichols Arboretum, University of Michigan, Ann Arbor
Hartland Consolidated School, Hartland

Wilcox & Laird, Union Guardian Bldg., Detroit
Duns Scotus College, Detroit
Grosse Pointe High School, Grosse Pointe
Plymouth Public Schools, Plymouth

MINNESOTA

Hugh Vincent Feehan, 1004 Marquette Ave., Minneapolis
St. Thomas College, St. Paul
College of St. Scholastica, Duluth
Deep Haven High School, Deep Haven

Morell & Nichols, Inc., 1200 Second Ave., South, Minneapolis
University of Minnesota, Minneapolis
Washington State College, Pullman, Wash.
Carleton College, Northfield

MISSISSIPPI

Herbert B. Campbell, 909 North St., Jackson
John Carroll University, Cleveland, Ohio
All School Grounds (12), Jackson
Mississippi War Memorial, Jackson

MISSOURI

Hare & Hare, 114 W. 10th St., Kansas City
University of Kansas City, Kansas City, Mo.
Athletic Center and Stadium Setting, Houston, Texas
63 Schools, Fort Worth, Texas

John Noyes, Railway Exchange Bldg., St. Louis
Ladue School, Ladue
Webster Groves Schools, Webster Groves
Lincoln University, Jefferson City

NEW JERSEY

Brinley & Holbrook, 21 South St., Morristown
New Jersey State Teachers College, Trenton
New Jersey State Hospital, Marlboro
State Training School for Girls, Totowa

Michael M. Burris, 485 Engle St., Englewood
Dwight Morrow High School, Englewood
Teaneck High School, Teaneck
Junior High School, Basking Ridge

Frederic C. Hoth, 396 Allaire Ave., Leonia
Academy of the Holy Angels, Fort Lee
St. Cecelia High School, Englewood
St. Vincent De Paul, Bayonne

NEW YORK

Sheffield A. Arnold, Inc., 101 Park Ave., New York
Manhasset Grade School, Manhasset
East Park Junior-Senior High School, East Park
Huntington Senior High School, Huntington

A. F. Brinckerhoff, 101 Park Ave., New York
Trinity College, Hartford
Millbrook School for Boys, Millbrook
State Training School for Feeble Minded, Southbury, Conn.

Harold A. Caparn, 144 E. 30th St., New York
Lebanon Valley College, Annville, Pa.
Brooklyn College, Brooklyn
Brooklyn Botanic Garden, Brooklyn

Laurie D. Cox, 136 Kensington Place, Syracuse
Whitesboro Central School, Whitesboro
Hartsdale School, Westchester Co.
Chancellor Livingstone School, Hudson

Alling S. DeForest, 16 Fair Place, Rochester
High School and North Street School, Geneva
Villa de Chantal, Rock Island, Ill.
Colgate-Rochester Divinity School, Rochester

Alfred Geiffert, Jr., The Office of, 101 Park Ave., New York
University of Illinois, Urbana
Hunter College, New York
New Jersey College for Women, New Brunswick, N. J.

Francis Hastings Gott Associates, 920 Merchants Rd., Rochester
East Bloomfield High School, East Bloomfield
Union Free School District No. 1, Brighton
Nazareth College, Pittsford

William E. Harries, 110 Franklin St., Buffalo
Ripley Central School, Ripley
North Park School, Lockport
Corfu Central School, Corfu

Helen Swift Jones, 101 Park Ave., New York
Adelphi College, Garden City
Avery Convalescent Hospital, Hartford, Conn.
Prospect Heights Hospital, Brooklyn

Roeder J. Kinkel Associates, 438 Delaware Ave., Buffalo
Evangelical Training School, Dunkirk
Batavia High School, Batavia
Masten Park School, Buffalo

Charles Downing Lay, 101 Park Ave., New York.
High School, Greenbush
Lenox School, Lenox, Mass.
New York State Normal Training School, Cortland

H. B. Littlefield, "Little Field," North White Plains
Central High School, Hancock
High School and Stadium, White Plains
Battle Hill School, White Plains

William Pitkin, Jr., 2045 East Ave., Rochester
University of Michigan, Ann Arbor, Mich.
Kalamazoo College, Kalamazoo, Mich.
University of Rochester, Rochester

N. A. Rotunno, Professor of Landscape Architecture, Syracuse University, 120 Dorset Road, Syracuse
Syracuse University, Syracuse
Genoa Central School, Genoa

Richard Schermerhorn, Jr., 342 Madison Ave., New York
St. Joseph's College for Women, Brooklyn
Albany Academy, Albany
Rensselaer Polytechnic Institute, Troy

Jacob John Spoon, 128 Greenacres Ave., White Plains
Academy of St. Joseph-in-the-Pines, Brentwood
Penn. Township School Dist. High School Grounds, Bernville, Pa.
Central School District No. 1, Pine Plains

A. Carl Stelling, 101 Park Ave., New York
Athletic and Recreation Grounds, Bronxville
Mahopac Central School Grounds, Mahopac
Wappingers Central School Site, Wappingers Falls

Thomas Lyon White and Leonard G. Wheeler, Office of 445 S. Warren St., Syracuse
Cato-Meridian School, Cato
Middlesex Valley Central School, Rushville
Hartford Central School, Hartford

NORTH CAROLINA

E. S. Draper Associates, 2038 Beverley Dr., Charlotte
Winthrop College, State College for Women, Rock Hill, S. C.

R. J. Pearse, Falls Rd., Route No. 1, Raleigh
Needham Broughton High School, Raleigh
Merideth College, Raleigh
Birmingham-Southern College, Birmingham, Ala.

R. D. Tillson, 222 Hillcrest Drive, High Point
Greenville Senior High School, Greenville, S. C.
High Point College Athletic Fields and Stadium, High Point
High Point Junior High School, High Point

OHIO

Alexander & Strong, 4500 Euclid Ave., Cleveland
Kent State University, Kent
University School, Shaker Heights
Mentor Village School, Mentor

Arthur S. Berger, 1217 Madison Ave., Toledo
Maumee Valley Country Day School, Maumee
Toledo Society for Crippled Children, Toledo
Toledo Hospital, Toledo

Raymond W. Blanchard, Chief, Division of Design, Cincinnati Public Recreation Commission, 3433 Clifton Ave., Cincinnati
Walnut Hills High School Recreation Area
Western Hills High School Recreation Area Airport

Hannah I. Champlin, Elsetta Gilchrist, Lucile Teeter Kissack, 4500 Euclid St., Cleveland
High School, Salem
High School, Little Valley, N. Y.
Forest Lawn Memorial Chapel, Youngstown

L. G. Linnard, 618 Pierce St., Maumee
Maumee High School, Maumee
Maumee Valley Country Day School, Toledo
Tau Beta Camp, Detroit and Lapeer

Chas. R. Sutton, 1065 Westwood, Columbus
Ohio State University Golf Course, Columbus

A. D. Taylor, 4614 Prospect Ave., Cleveland
Oregon State University, Corvallis
Carnegie Institute of Technology, Pittsburgh, Pa.
Notre Dame College, Cleveland

OKLAHOMA

Max Pfaender, 2225 N. E. 21st St., Oklahoma City
Sacred Heart College, Yankton, S. D.
Junior College, Freeman, S. D.
Eastern State Teachers College, Madison, S. D.

OREGON

Fred A. Cuthbert, 2367 Fairmount Blvd., Eugene
University of Oregon, Eugene
Eastern Oregon College of Education, La Grande
Corvallis High School, Corvallis

W. Dorr Legg, Corvallis
Oregon College of Education, Monmouth
Linn County Court House, Albany

Arthur L. Peck, Professor of Landscape Architecture, Oregon State College, Corvallis
Chemistry Building, Oregon State College
Wing on College Library, Oregon State College
Exhibition Gardens, Oregon State College

PENNSYLVANIA

John R. Bracken, Professor of Landscape Architecture, Pennsylvania State College, State College
Indiana State Teachers College, Indiana
Laurellton State Village for Women, Laurellton
Pennsylvania Industrial School for Boys, Whitehill

Loutrel W. Briggs, Turk Road, Doylestown
Dobbs Ferry High School, Dobbs Ferry, N. Y.
Highland School, Pelham, N. Y.
Tannersville School, Tannersville, N. Y.

James Bush-Brown, Architects Bldg., Philadelphia
School of Horticulture, Ambler
Glenwood Housing Project, Philadelphia
Abbotsford Housing Project, Philadelphia

Harry B. Hostetter, Box 566, Lancaster
Reformed Theological Seminary, Lancaster
Linden Hall Seminary, Lititz
Pennsylvania Soldiers' Orphan School, Scotland

T. M. Kohankie, Professional Bldg., Pittsburgh
Homeville Junior High School, Mifflin Twp.
Emerson Elementary School, Mifflin Twp.
Lebanon Junior High School, Mifflin Twp.

McCloud & Scatchard, Dauphin Bldg., Harrisburg
Lock Haven State Teachers College, Lock Haven
Bloomsburg State Teachers College, Bloomsburg
Lititz Public School Grounds, Lititz

Wheelwright & Stevenson, 225 S. 15th St., Philadelphia
The Gunnery School, Washington, Conn.
St. Andrews School, Middletown, Del.
Muhlenberg College, Allentown

SOUTH CAROLINA

Albert Schellenberg, 817 Henderson St.
High School, Titusville, Fla.
High School, Holly Hill, Fla.
Marine Research Laboratory, Edisto Island

TEXAS

C. Coatsworth Pinkney, 5512 Shoalwood Ave., Austin
School, Bastrop
City Hall, Bonham
Austin-Travis County Sanitarium, Austin

R. F. Taylor, Bankers Mortgage Bldg., Houston
Laundry and Help's Dormitory, A. & M. College of Texas, College Station (*p, h, e*)
Six Dormitories, A. & M. College of Texas, College Station (*p, h, e*)
Winnfield Elementary School, Winnfield (*h*)

VIRGINIA

Albert A. Farnham, 1240 White Oak Rd., Roanoke
The Virginia Polytechnic Institute, Blackburg
Hollins College, Hollins
Warren County High School, Front Royal

Charles F. Gillette, 105 E. Cary St., Richmond
Bennett College, Greensboro, N. C.
Washington and Lee University, Lexington
St. Giles Church, Richmond

Frank E. Patterson, III, 210 E. Franklin St., Richmond
Four Public School Grounds, New Castle, Pa.
Five County School Grounds, Lawrence Co., Pa.
Castle View Burial Park, New Castle, Pa.

WISCONSIN

Phelps Wyman, 759 N. Milwaukee St., Milwaukee
State Industrial School for Girls, Oregon
Central and West Grade Schools, Rhinelander
High School Gymnasium, Shullsburg

HAWAII

Robert O. Thompson, 5375 Kalanianaole Highway
McKinley High School, Honolulu
Central Junior High School, Honolulu
Waialee Boys' School, Honolulu

Richard C. Tongg, 2258 Metcalf St., Honolulu
Baldwin High School, Maui
Kapaa Intermediate School, Kauai
W. R. Farrington High School, Honolulu

O. M. Scott & SONS COMPANY

Turf Service for Schools

Dept. WPOST — Marysville, Ohio

Lawn Care

FREE BULLETIN SERVICE

Grass growing presents many and intricate problems—most of which someone has solved.

In the little bulletin called LAWN CARE you will find the answers to your turf questions. It doesn't represent what one or a dozen persons think about a lawn problem. It is a condensation of the experiences of hundreds of competent authorities and laymen.

If you are not already receiving LAWN CARE, just let us know. A full set of all bulletins to date will be sent in loose-leaf binding without charge or obligation. Future bulletins will be brought to you 5 times yearly by the postman. No salesman will call.

•

OTHER SCOTT SERVICES

Free Soil Testing—laboratory analyses made of your samples. Written report and recommendations submitted. No charge.

Weed Identification—specimen plants identified and methods suggested for their control. No charge for this service.

Consultation—write us about any of your grass-growing problems. Results of our specialized experience available without charge.

•

Scotts Seed is known the country over for its dependable quality. It has produced fine turf on more than 1600 golf courses and is the preference of scores of colleges, universities and high schools for their athletic and campus areas.

ATHLETIC FIELD MIXTURE if you want tops in turf on a field you're proud to exhibit.

PLAYGROUND MIXTURE for those less conspicuous and less particular areas.

CAMPUS MIXTURE available in top quality and also in a popular price quality.

SPECIAL MIXTURES for special places. Let us quote on any formula that you use.

SEPARATE GRASSES. As largest handlers of grass seed in U. S. we can quote attractive prices on good quality.

TURF BUILDER the special food for grass. You can have better turf and save money on seed by using this food.

COLDWELL LAWN MOWER COMPANY

Manufacturers of

Hand, Horse and Motor Lawn Mowers

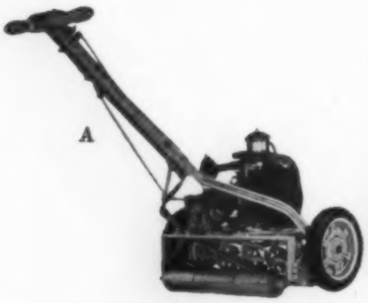
SINCE 1867

Newburgh, N. Y.

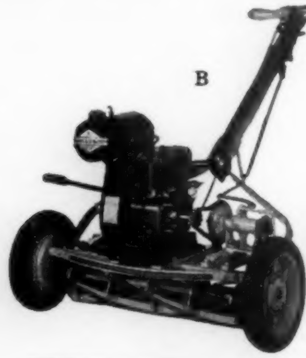
COLDWELL POWER MOWERS AND HAND MOWERS
MODELS FOR EVERY TYPE LAWN AND EVERY PURPOSE

"Coldwell Lawn Mowers Give You More Mower for Your Money"

A

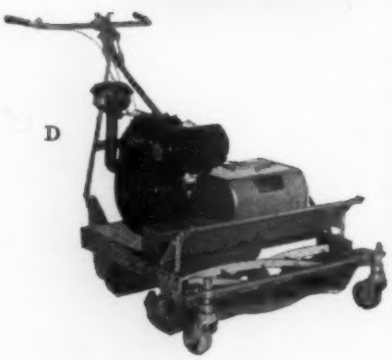


B

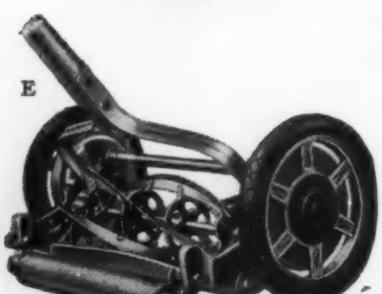


C

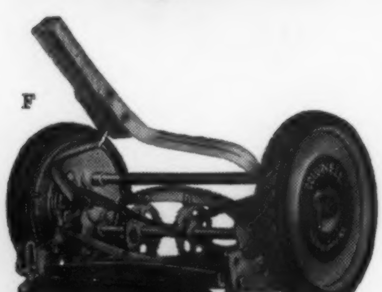
D



E



F



A. COLDWELL BADGER—An amazing new small power mower built to meet the demand for an extremely low-priced machine. Mows, rolls and trims. Simply constructed, easy to operate. Uses only ⅝ gal. fuel per 8 hours. Width of cut, 19". Cuts ½ to 1¼ acres per day. Fine for trimming in parks, cemeteries and around schools and campuses. Ideally supplements larger equipment.

B. COLDWELL BEAR—A sturdy power mower that makes light work of mowing, rolling and trimming a large expanse of lawn. Cuts evenly and trims close to hedges, shrubbery, trees and walls and along the edges of walks and drives. Air-cooled Briggs & Stratton motor, 21" cut, 5 blades, cuts 2 to 3 acres per day. standard high quality Coldwell construction throughout. A thoroughly dependable machine. Write for folder.

C. COLDWELL SUPER STANDARD 30" WITH GANGS AND SULKY—Especially designed for use on Estates, Campuses, Parks, Parkways, Golf Courses and other large lawn areas. Abundant power for steep grades and thick, tough or heavy grasses. Gang units easily and quickly attached. Used singly this machine trims neatly along drives, walks and borders. 30" cut single; 65" cut using gang mowers. Capacity from 5 to 14 acres per day depending on number of gangs. Write for complete Power Mower Catalog.

D. COLDWELL STANDARD 25" MODEL—Mows, trims and rolls medium sized lawn areas with a minimum of time and effort. With Coldwell Gang Units attached, the cutting width is increased. Hand throttle permits complete and instant flexibility of speed at all times. Dual control provides power both for travelling and cutting. For complete data, write for Power Mower Catalog. Also made in 21" model known as the CUB.

E. NEW IMPERIAL SPECIAL—A new leader in the Coldwell line of hand mowers:—the old Imperial completely modernized, with several new unusual features. A machine that will really last a lifetime. Width of cut, 16", 18" or 20". Equipped with steel flanges.

F. DIPLOMAT SPECIAL—A quality hand mower of medium weight, equipped with semi-pneumatic tires. Useful as a general all-purpose machine for a well-kept lawn. Handy on both the small grass plots and large areas, and also for terraces. Built for rugged service. Width of cut 16" and 18".

● For over 70 years—ever since 1867—the Coldwell Lawn Mower Company has pioneered in the development and manufacture of superior lawn mowers. Superior not only in their long service life and low operating cost, but also in their superior efficiency in the maintenance of beautiful lawns. Educational directors, Superintendents of Schools and Universities and others in charge of large lawn areas find the Coldwell line of mowers covers every possible mowing requirement. Write for Catalog.

ECLIPSE LAWN MOWER COMPANY

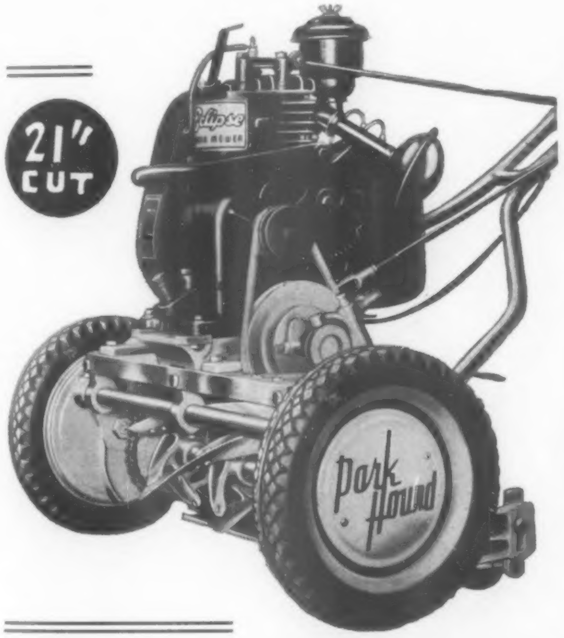
Factory and General Offices: Prophetstown, Illinois

Eclipse

AMERICA'S FINEST MOWER
for
SUPREME PERFORMANCE

Eclipse presents mowers of custom quality and modern styling. Each outstanding and designed for perfect lawn maintenance with utmost ease of operation. Famous exclusive features of Finger-tip Adjustment and Automatic Sharpening—no tools required. Insure the economy of the best.

21" CUT



\$125.00
F. O. B. Factory

Parkhound

Geared to present-day mowing standards with that built-in staying quality

A new creation of advanced engineering with a new brisk power action, with that solid, delightful handling ease. A feat of brilliant performance that will save upwards to 50% in operating economy.

Performance features include powerful 4-cycle Briggs & Stratton Motor—Natural Grip all steel handle—Goodyear puncture-proof tires—Timken reel and wheel bearings and other features equally outstanding.

SPEEDWAY

32" CUT

\$350.00
F.O.B. FACTORY
SULKY EXTRA

5 TO 7 MILES Per HOUR

SPEED DOUBLED
ACREAGE DOUBLED
ECONOMY DOUBLED

Fastest, Perfect Cutting Power Lawn Mower Ever Built

Imagine a 32" swath 150 feet long every 15 seconds—600 feet a minute—actual stopwatch time. Positive operator control, the easiest handling power mower ever developed.

Eclipse, the World's Largest Producers of Power Mowers

Write for details and demonstration

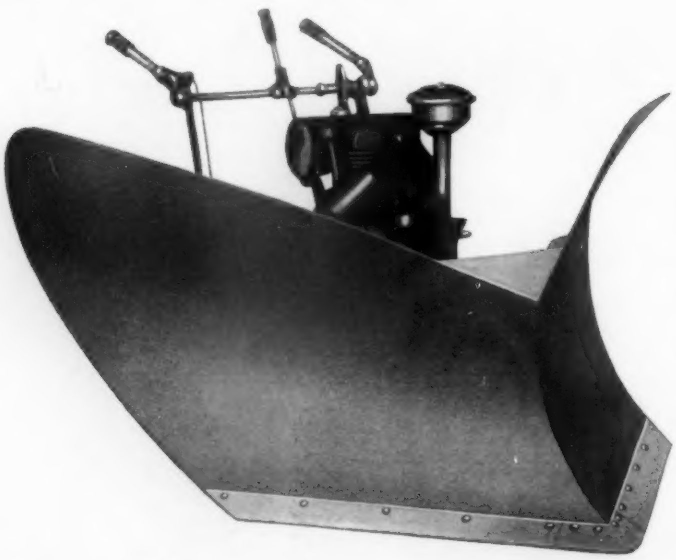
IDEAL POWER LAWN MOWER COMPANY

438 Kalamazoo Street, Lansing, Michigan

COMPLETE LINE OF GRASS CUTTING AND SNOW REMOVAL EQUIPMENT

The Ideal Caretaker Mower is particularly well adapted to the care of school and college lawns because the tractor is designed to operate a number of interchangeable tools for year around service. Mowing, removing snow, rolling, spiking, sweeping are jobs that the Caretaker will handle with economy and efficiency.

With two 21 inch trailer units, as illustrated, the mower has a cutting width of 64 inches. With front unit only its cutting width is 32 inches. Power mowers in other models in 20, 21, 22 and 30 inch sizes suitable for both large and small school lawns.

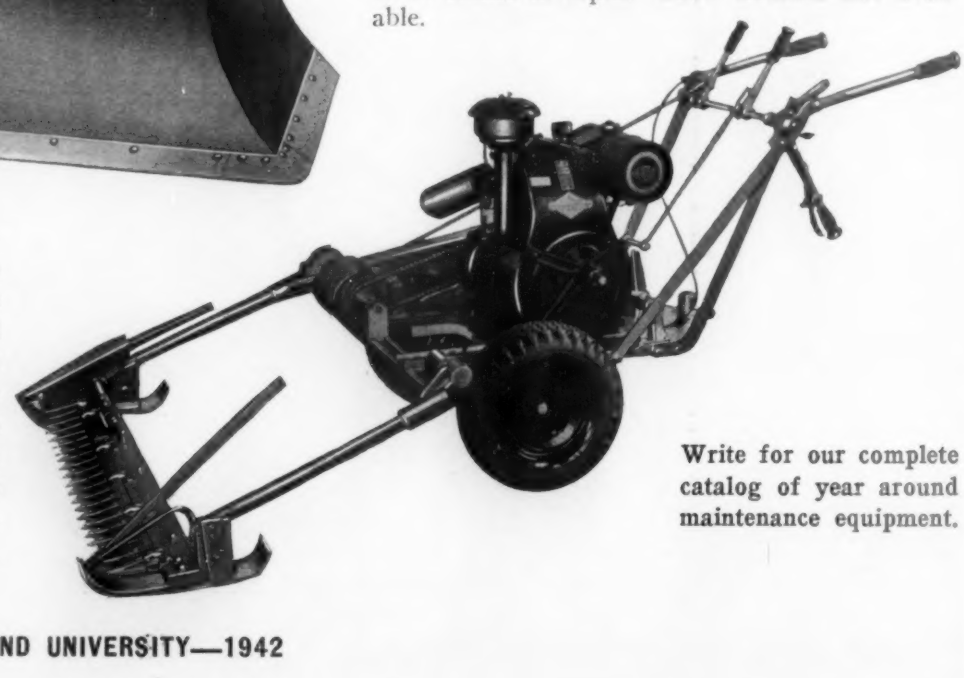


MOTORIZED SNOW PLOWS

For speedy, economical snow removal use the Caretaker tractor equipped with one of our sidewalk snow plows. The V-Type Snow Plow clears a path 45 inches wide, the Reversible Blade Plow (not shown) is adjustable to widths of 40 to 45 inches, and delivers snow at either side. These plows are sturdily built and will handle snow up to 18 inches in depth. Snow Brushes also available.

SICKLE BAR MOWER

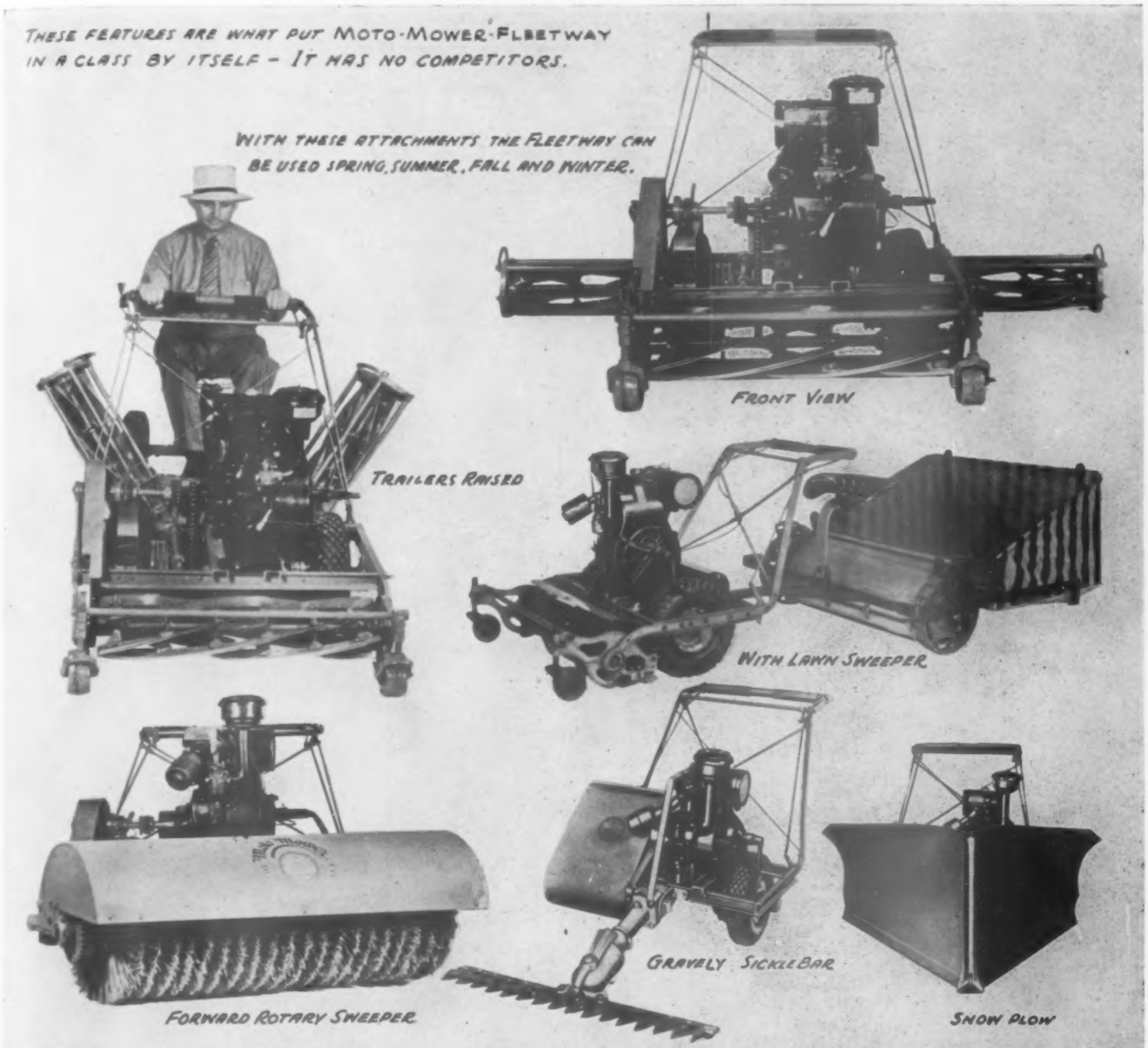
The Sickle Bar Mower is interchangeable with the regular reel type mower and uses the same clutch control and is driven from the same sprocket. Ample clearance for mowing tall weeds with guards at both ends of cutter bar. Sliding shoes are adjustable for height of cut. Very easy to operate.



Write for our complete catalog of year around maintenance equipment.

THE MOTO-MOWER COMPANY

Main Office: 4600 Woodward Avenue, Detroit, Michigan



WHIRLWIND LAWN MOWER CORPORATION

730 W. Virginia Street, Milwaukee, Wisconsin

WHIRLWIND ROTARY SCYTHE POWER LAWN MOWERS

For more than a decade each day has offered added proof that **WHIRLWINDS** with their "suction and scythe action" are doing a bigger, more complete job, with lower cost — at schools, air ports, private estates, cemeteries, army posts and elsewhere throughout the nation.

SUCTION accomplished by simple, scientifically formed cutting blades, gives to **WHIRLWIND POWER LAWN MOWERS** the distinction of being the **"Only Ones Of Their Kind."** They will help make fine lawns finer, coarse fields into fine lawns, eliminate hand trimming, consume less power, reduce maintenance and operating costs, handle with maximum ease, and conserve man hours.

EASY TO ADJUST cutting level from grass roots to four inches above. Readily adaptable to any lawn or field condition.
SAFETY is assured by thoroughly tested, front and rear guards.
BLADES KEPT SHARP with occasional use of ordinary file.
CLIPPINGS REDUCED to finer mulch by rapid scythe action.
FREE from power consuming blade to blade friction.
SIMPLE CONTROL permits operator to engage or disengage the cutting unit without stopping.

CUTS on forward or backward travel. Simplifies trimming.
SAFETY BELT prevents damage from hidden obstructions.
SULKY available for still greater ease and more speed.
SUCTION lifts spreading growths so they cannot escape cutting — no unsightly spears are left by a **WHIRLWIND**. Growths clinging to walls or edges need not be left for hand trimming. **WHIRLWINDS ARE VERSATILE — THEY DO A BIGGER JOB.**

. . . . . ASK FOR A DEMONSTRATION

WHIRLWIND

. . . SEE ONE IN ACTION ON YOUR OWN PREMISES

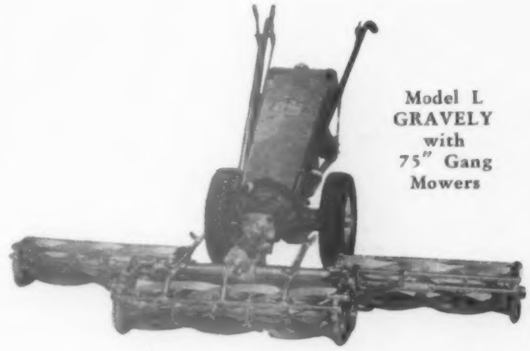
GRAVELY MANUFACTURING COMPANY

Box 252, Dunbar, W. Va.

Model L GRAVELY
with
Vee-Type Snow Plow

Schools and universities throughout the country recognize the distinct advantages of the GRAVELY—the **only** machine that solves so many upkeep problems.

1. **Mows Your Lawn**
2. **Cuts Tall Weeds and Grass**
3. **Removes Snow**



Model L
GRAVELY
with
75″ Gang
Mowers

A YEAR-ROUND MACHINE

You buy ONE sturdy 5 H. P. Tractor . . then, change **power** attachments according to the job. With the GRAVELY **one** man does everything. . . .
A 30-inch Power Driven Rotary Mower for the lawns (power-driven gang units and riding sulky available for the larger areas) . . . a Power Sickle Mower for the rough spots and athletic fields. . . .
A power sprayer . . . A Power Pump . . . A cart for moving dirt . . . or odd jobs of hauling.
. . . Both Vee and a Patented Reversible Blade Type Snow Plow capable of working in 12″ of snow. Whatever the job, if you own a GRAVELY you have the equipment and sufficient power to do it.

FRUITS OF SPECIALIZATION

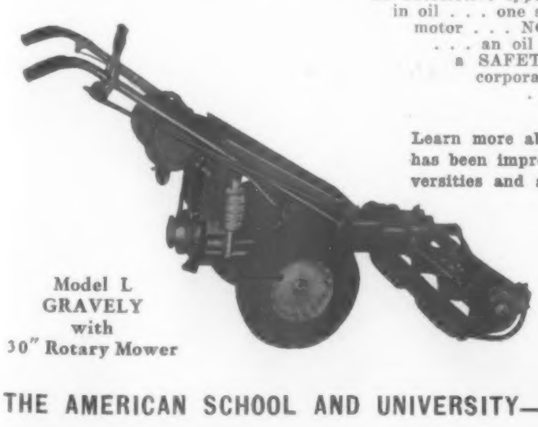
The GRAVELY is produced in a factory devoted to manufacturing nothing else. This includes making the motor as well. Each manufacturing operation is controlled. This means that each machine is produced as a complete unit, each part **designed to** be used with the others . . . **not an assembling proposition.**

The GRAVELY products are sold **and serviced** through Dealers, for all GRAVELY Dealers are qualified to render service on the machines they sell. Write us that you may check with our representative in your neighborhood. Like the product, you will find our sales policy practical . . . you are not asked to buy a machine without first being shown what it will do,—under your very own conditions.

EXCLUSIVE GRAVELY FEATURES

There is a 5 H. P. motor . . . **two** forward and reverse speeds . . . an automotive type differential . . . a worm gear drive running in oil . . . one spot lubrication system for both tractor and motor . . . NO CHAINS . . . an oil bath air cleaner . . . an oil filter to clean and strain the oil . . . a SAFETY SLIP CLUTCH individually incorporated into each power attachment . . . and many, many others.

Learn more about a machine that for TWENTY years has been improving the appearance of schools and universities and at the same time reducing upkeep costs.



Model L
GRAVELY
with
30″ Rotary Mower

Ask for our catalog entitled:
"MAKING AND KEEPING A BEAUTIFUL LAWN"

Model L
GRAVELY
with 42″ Sickle Mower

ANCHOR POST FENCE COMPANY

Complete Line of Fences and Playground Equipment

6695 Eastern Ave., Baltimore, Md.
SALES OFFICES IN PRINCIPAL CITIES

ANCHOR FENCES FOR SCHOOLS AND SCHOOL PLAYGROUNDS

The Anchor Post Fence Company has been serving public schools and colleges, municipalities and industrial plants with fencing and playground equipment to suit their various requirements for half a century.

Anchor Chain Link Fences

Makers of America's first chain link fence, the Anchor Post Fence Company today manufactures a complete line, and will be glad to supply any interested school executive or architect with a copy of our Chain Link Fence Catalog containing full information about the four exclusive features which make an Anchor Chain Link Fence exceptionally attractive and durable. **Ask for Catalog No. 110.**

Anchor-Weld Iron Fences and Gates

Through the exclusive Anchor-Weld method of construction, the Anchor Post Fence Company is able to manufacture iron fences and gates which equal in appearance many expensive hand-wrought products. Many schools throughout the country are today justly proud of their beautiful Anchor-Weld Ornamental Iron Fences and Gates. Some of these are to be found illustrated in our **Catalog No. 111.**

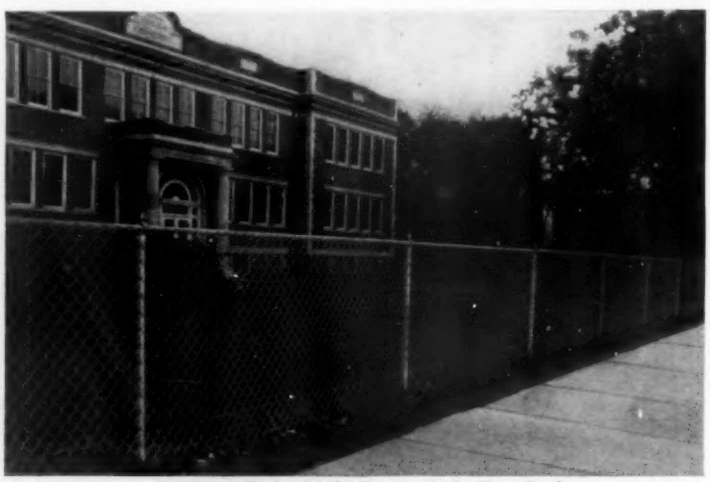
Anchor Drive-Anchorage

Anchor's Four Exclusive Features

1. **ANCHOR-WELD WIRE GATE**—built with a frame of square tubular steel—arc-welded at the corners. The square shape of the heavy steel tubing, together with the welding of the corners, provides a framework of such exceptional strength that no re-enforcing diagonal braces are needed. We claim that this is the strongest and most attractive wire gate made.
2. **SQUARE TERMINAL POSTS**—stronger because they are square in section. More protective—having no fabric-holding bands and therefore providing no footholds for climbing. Better-looking—because of their graceful lines.
3. **U-BAR LINE POSTS**—made of high carbon steel and U-shaped in section to insure maximum strength.
4. **DRIVE-ANCHORAGE**—grips the soil like the roots of a tree. We have imitated nature's engineering by providing the line posts with a broad foundation. Anchor drive-anchors defy thaws, frosts and the many other strains to which a fence is subjected.

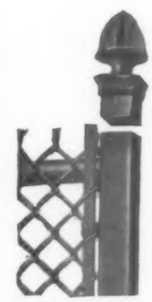
Note: While we strongly advocate the drive-anchor method of setting posts, we can, if desired, set our posts in concrete footings when conditions warrant such a procedure.

Anchor-Weld Wire Gate

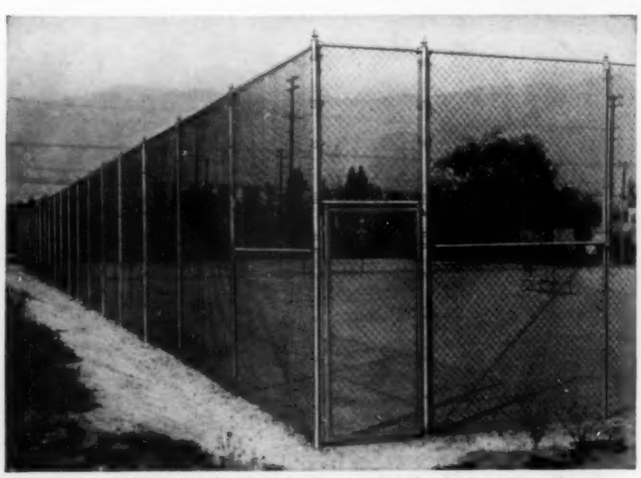


Anchor Chain Link Fence with Top Rail
High School, Mineola, N. Y.

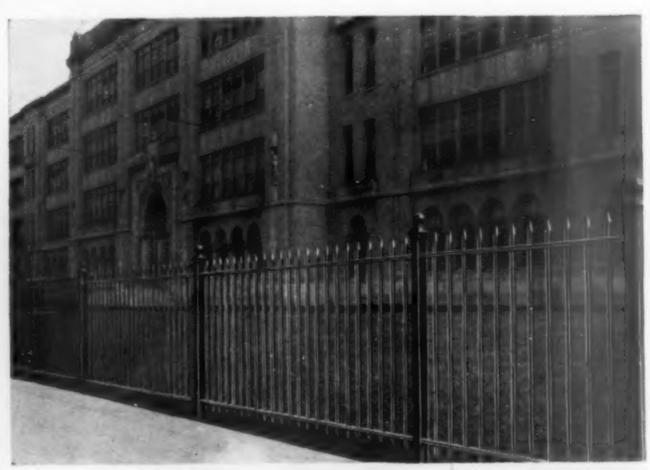
Anchor U-Bar Line Post



Anchor Square Terminal Post



Anchor Chain Link Tennis Court Enclosure at Pasadena High School, Pasadena, Calif.



Anchor-Weld Fence Surrounding St. Anne's School, Fall River, Mass.

CONTINENTAL STEEL CORPORATION

Manufacturers of Chain Link Fence for All Purposes

General Office: Kokomo, Indiana

SALES REPRESENTATIVES IN THE FOLLOWING CITIES

Alexandria, La.; Austin, Texas; Atlanta; Canton; Chicago; Columbus; Dallas; Dayton; Des Moines; Detroit; El Paso; Evansville; Ft. Wayne; Grand Rapids; Indianapolis; Kansas City; Louisville; Minneapolis; New Orleans; New York; Norfolk; Oklahoma City; Omaha; Philadelphia; Richmond; San Antonio; South Bend; St. Louis; St. Paul; Toledo; Tulsa; Wichita

COMPLETE CHAIN LINK FENCE

To meet the fencing requirements of schools and universities, Continental has developed a wide range of structural variations in its Chain Link fence. The selection in styles, heights, types of top construction, gates and accessories makes it possible for schoolmen to select the best fence for any installation.

FABRIC OF KONIK STEEL

MADE OF KONIK STEEL

The wire fabric in Continental Chain Link fence is made of KONIK—a new steel containing copper, nickel and chromium for greater strength and rust resistance "clear through." This superior fence fabric carries a zinc coating applied by a special hot dip process to insure uniformity and adhesion of the coating to the base steel. A uniform, bright finish enhances the appearance of Continental fence fabric. Wire is full gauge and woven in exact mesh.

> **NOTICE**
>
> ***Effective April 30, 1941, Continental Steel Corporation has complied with OPM Division of Priorities Order No. M-5 (Nickel Bearing Steel) and has discontinued adding nickel to steel used for Chain Link except where specified on a Defense Order with a Preference Rating.***

12 STYLES

Continental offers 12 styles of top construction for Chain Link fence. Six popular styles are illustrated to the right. Continental fence is engineered for each specific job.

POSTS AND FITTINGS

Continental fence has heavier, sturdier posts with improved brace construction. Top rails are joined by a special Inside-Outside coupling. Post caps and barbed wire arms are sturdy, heavier. Self-locking slots hold barb wire. New type lock pin eliminates bolts and nuts for fastening fabric to intension bands.

GATES

Strong and easily operated gates and locking devices. Single and double types with improved pivot type hinges. Manually or mechanically operated.

ENGINEERING AND ERECTION SERVICE

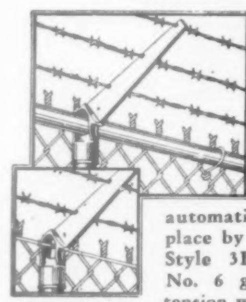
Our engineers are prepared to assist you in laying out the most economical installation for your purposes. Trained erection crews are available for correct and economical construction anywhere. When local labor is used Continental will supply competent foreman and inspection service.

WRITE FOR FREE FENCE MANUAL

Get a copy of "Modern Property Protection," complete manual on modern protection and control of property. Write or phone the

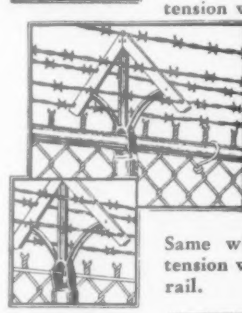
CONTINENTAL STEEL CORPORATION OR NEAREST SALES OFFICE

A STYLE TO MEET EVERY SCHOOL NEED



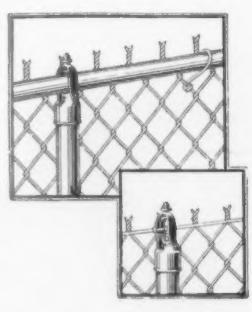
Style 3B-R—Three strands of barb wire with top rail. Arm of 12 gauge pressed steel. Barb wire held in angle slots and automatically locked in place by tension.

Style 3B-W—Same with No. 6 gauge coil spring tension wire instead of top rail.



Style 5B-R—Five strands of barb wire with top rail. Top rail of tubular steel 1⅝" O.D. Has 7" expansion sleeves.

Style 5B-W—Same with No. 6 gauge tension wire instead of top rail.



Style NB-R—No barb wire with top rail.

Style NB-W—Same with No. 6 gauge tension wire instead of top rail.

CONTINENTAL *Chain Link* FENCE

ROBERTSON STEEL & IRON COMPANY

Robertson Chain Link Fence

Second and Elm Streets, Cincinnati, Ohio

CHAIN LINK FENCING FOR EVERY PURPOSE

Robertson Chain Link Fence and Chain Link Gates for Tennis Courts, Athletic Fields, Swimming Pools, Recreation Grounds and other School Requirements.

ROBERTSON FENCES OFFER PERMANENCE — PROTECTION — PLEASING APPEARANCE

Robertson Fencing is permanent, pleasing in appearance, and offers the maximum protection for students. Whether your fencing problem is providing an adequate backstop for the tennis courts, a means of marking the limits of your campus, or keeping unwanted intruders out of the athletic field, Robertson has the adequate fence to meet the most rigid requirements.

STURDY CONSTRUCTION — HOT DIP GALVANIZED

Fabric as well as the line posts, top rail, and other framework is made of copper-bearing steel of unusually high tensile strength, heavily galvanized by the hot dip process after fabrication. The gate corners are fitted with malleable iron castings or electrically welded. Robertson products are well known for resisting corrosion.

QUALITY — SERVICE — PRICE

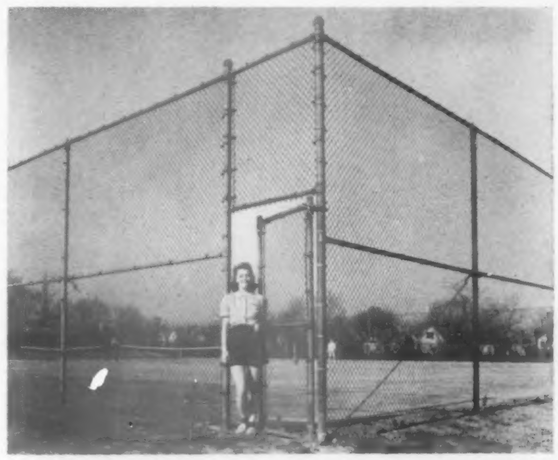
have been the keynotes to Robertson success in chain link fence manufacture. Only the finest grades of steel and malleables are used. We specialize in service that is geared to fast action. Large stocks are always available for immediate shipment from centrally located factory. Our Engineers are ready at all times to help you solve your problems, without charge or obligation.

Robertson Price is always right. We maintain a price policy which is independent and flexible, and always competitive.

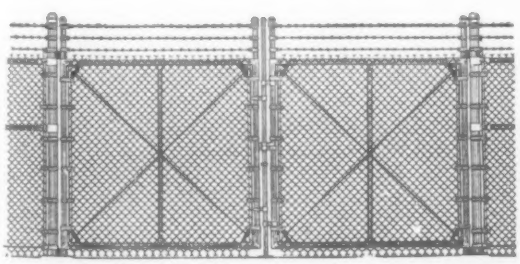
WRITE FOR FURTHER INFORMATION

Write for our catalog and learn what Robertson can do for you. Then let us submit estimates with or without erecting service. No obligation, of course.

ROBERTSON STYLE 400 and 500—is the ideal fencing for enclosing the school grounds. Standard heights of 3 to 12 feet. Sturdy, dependable, long lasting.

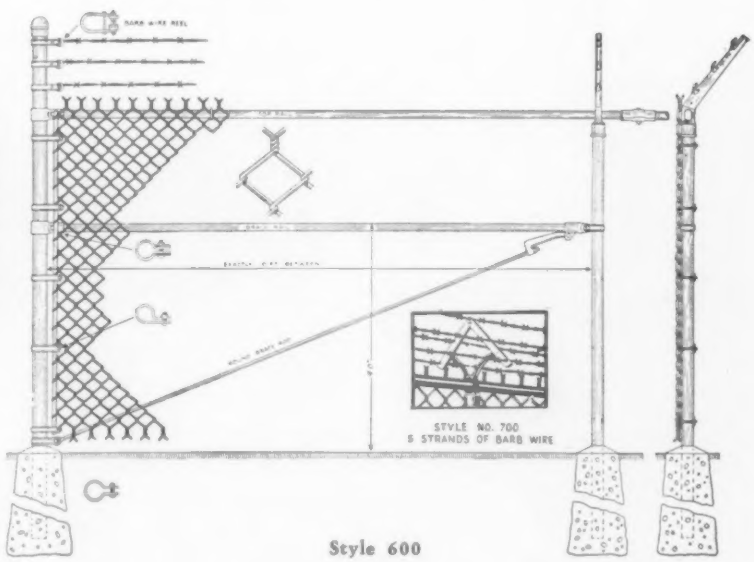


ROBERTSON STYLE 800 and 900 — will serve as an excellent tennis court backstop. Available in three heights, 8, 10, and 12 feet. Special heights to order. Will absorb a terrific amount of punishment.



ROBERTSON CHAIN LINK GATES (*Above*)—are heavily constructed. Furnished in all widths, single or double style, swing or slide type.

ROBERTSON STYLE 600 and 700 (*Right*)—are recommended for enclosing Athletic Fields. Cross-sectional view shows the rigid construction of the fence. Standard heights—5 to 12 feet.



Style 600

THE STEWART IRON WORKS COMPANY

"Fence Builders to America Since 1886" INCORPORATED

903 Stewart Block, Cincinnati, Ohio

PRODUCTS
Bronze Tablets
Chain Link Wire Fence and Gates
Flag Poles
Folding Chairs
Folding Gates

PRODUCTS
Iron Fence and Gates
Pipe Railing
Settees
Stadium Seat Brackets
Window Guards
Wire Mesh Partitions

FOR EVERY PURPOSE

Stewart offers Plain or Ornamental Iron and Chain Link Wire Fence and Gates for front, side and rear property lines; for athletic fields, tennis courts, recreation grounds and other school requirements.

Stewart Chain Link Wire Fence is the only ALL BEAM FRAMEWORK construction on the market.

Style 0TH Chainlink Wire Fence

Style 3TH

The Chain Link Wire Fence illustrations clearly show this exclusive feature. Notice the 3TH Oval-Back I-Beam Line Post with integral extension arm. Obviously this solid post is superior to pipe or other types of post requiring a separate pressed steel arm which may be removed or easily broken. Notice, too, that the beam top rail passes through the post itself—eliminating the need for fittings. The flat, smooth surfaces of Stewart All Beam construction offer maximum resistance to wear, weather and corrosion. This type of fence structure, exclusive with Stewart, is the heaviest and strongest manufactured.

Usual heights of style 3-TH shown in illustration are 7 ft. and 8 ft. overall. All materials are of Copper-Bearing Steel hot-dipped galvanized **after** fabrication to assure greatest possible resistance to rust.

Iron Fence Installation, Erie, Pa.

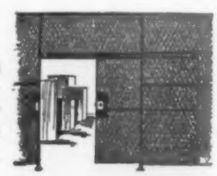
IRON FENCES AND GATES

For front property lines where dignity as well as protection is a requisite, Stewart offers a multiplicity of designs in plain or highly ornate iron. Here again Stewart construction is unique. The patented channel rail, exclusive with Stewart, adds immeasurably to the strength of the fence. All fittings are of Stewart design—the result of more than 56 years' experience and research in the fence building field.

METAL FOLDING CHAIRS

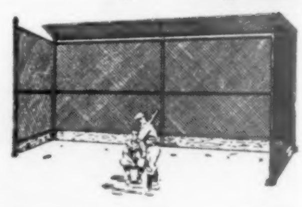
Built of strong steel channels. Full size seat with correctly pitched form-fitting back. Stewart Metal Folding Chairs are tip-proof. Standard finishes are: Black, Brown, Dark Green, Mahogany or Taupe. Literature and prices furnished upon request.

WIRE PARTITIONS



Effective and economical enclosures for locker rooms, stock rooms, supply rooms, tool rooms, machinery, power houses, etc. When writing for prices please send sketch giving measurements.

BACKSTOPS



Ideal for hard or soft baseball diamonds, tennis and badminton courts, etc. Sturdily constructed to stand the toughest abuse. Literature and prices furnished on request.

BRONZE PLAQUES

Plaques and tablets of hand-chased cast bronze, are available in stock sizes from 9" x 16" to 24" x 36". Special sizes will be made to order. Literature and prices gladly sent on request.

CATALOGS — SALES AND ERECTION SERVICE

Literature is available on all Stewart products. If interested in Chain Link Wire Fence ask for Catalog No. 79. If in Iron, ask for Catalog No. 81. When requesting catalogs, please indicate products in which you are primarily interested.

Stewart maintains sales and erection offices in all principal cities. Consult your local classified telephone directory or write direct to factory.

WICKWIRE SPENCER STEEL COMPANY

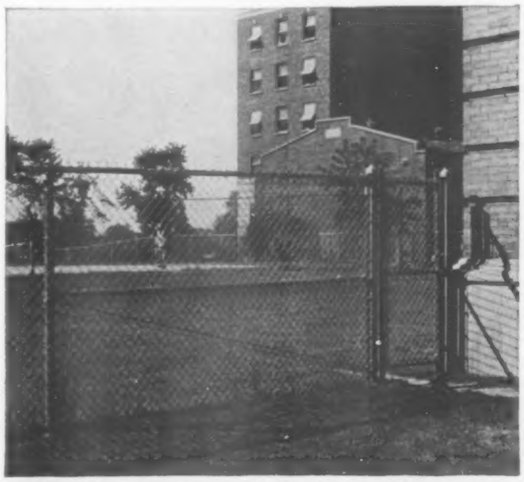
General Sales Office (Fence Dept.), 70 Niagara St., Buffalo, N. Y.

DISTRICT SALES OFFICES

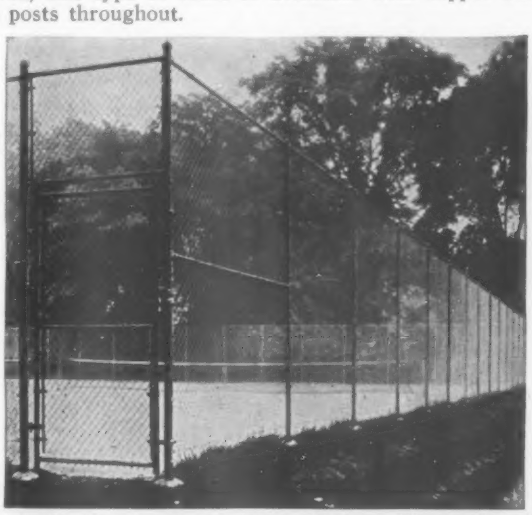
New York City Chicago Worcester San Francisco Los Angeles Seattle

DISTRIBUTORS AND ERECTORS IN ALL PRINCIPAL CITIES

THE Wickwire Spencer Steel Company offers Chain Link Fences for all types of property, including schools, playgrounds, athletic fields, tennis courts, etc. Manufactured entirely in their own plants with complete control from mine to consumer. Sold with complete installation, or if preferred, we will furnish all necessary materials to be installed by others or with the services of a supervising foreman. All posts are furnished to set in concrete footings. (Concrete preserves the metals from corrosion below the surface.) All materials except non-ferrous metals are hot galvanized after fabrication.

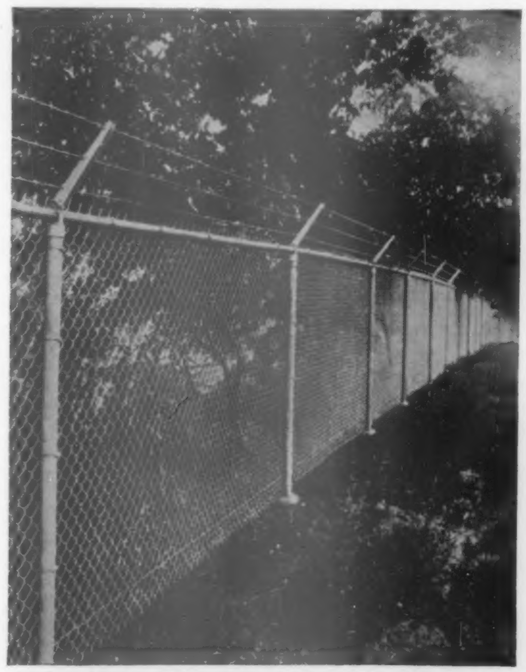


Wickwire Spencer Type 420H Fence, using "H" section line, end, corner and gate posts. A design virtually foolproof as no bolts or nuts are exposed for possible tampering. Gates of similar construction using heavy square tubing with specially reinforced heavy hinges and locking devices. If desired, this type of fence is available with copper bearing pipe posts throughout.



Wickwire Spencer Tennis Court Design. Illustration shows a typical Tennis Court Fence design. Two types are available—310 (light construction) and 420 (heavy construction). Standard heights, 8', 10' and 12'.

Wickwire Spencer Type 425 Fence. Same as Type 423, except that five strands of barbed wire are used, supported by a triangular arm.



Wickwire Spencer Type 423 Fence with three strands of barbed wire. Illustration shows pipe posts throughout. Gates to match. This type is also available with "H" posts same as shown in Type 420H illustration, with gates of similar construction.

Write to this office direct, or to any of our district offices shown above, for catalogs, and full particulars. Distributors may be located near you. Ask us who they are. Estimates and engineering services will be furnished without any obligation on your part.

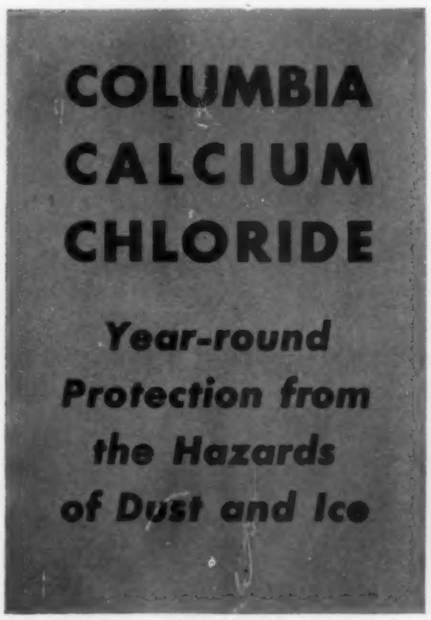
PITTSBURGH PLATE GLASS COMPANY

COLUMBIA CHEMICAL DIVISION

30 Rockefeller Plaza
New York, N. Y.

Chicago . Boston . St. Louis . Pittsburgh . Cincinnati . Cleveland . Minneapolis . Philadelphia . Charlotte

COLUMBIA CALCIUM CHLORIDE



Few materials as economical and easy to use as Columbia Calcium Chloride pay such important dividends in health, safety and comfort.

When applied to tennis courts, playgrounds, driveways and similar dust-breeding areas, Columbia Calcium Chloride effectively checks the nuisance and dangers of dust.

Because of the effectiveness of Columbia Calcium Chloride in drawing moisture from the air, two applications are sufficient to assure a moist, compact, dust-free surface. One application should be made at the beginning of the dust season, and a lighter one about six or eight weeks later.

During the winter months, Columbia Calcium Chloride is an important safeguard against personal injury from icy walks and pavements. Even at zero temperatures, it melts ice from walks and stairways. Mixed with sand or cinders, it skidproofs drives and roadways much more effectively and quickly than untreated abrasives.

Columbia Calcium Chloride in the form of easily handled white flakes is available in 100 lb. moisture-proof paper bags and in 400 lb. steel drums.

COLUMBIA CLEANER AND CLEANSER

A white powder especially prepared for hand cleaning operations, including glass, china, walls, refrigerators and other equipment. It is widely used by schools, clubs, dairies, hospitals, and restaurants.

COLUMBIA DETERGENT

This is a carefully prepared and blended cleaning mixture of the scouring type. It is especially suitable for large-area cleaning jobs such as enameled and painted surfaces, and tile or marble walls and floors.

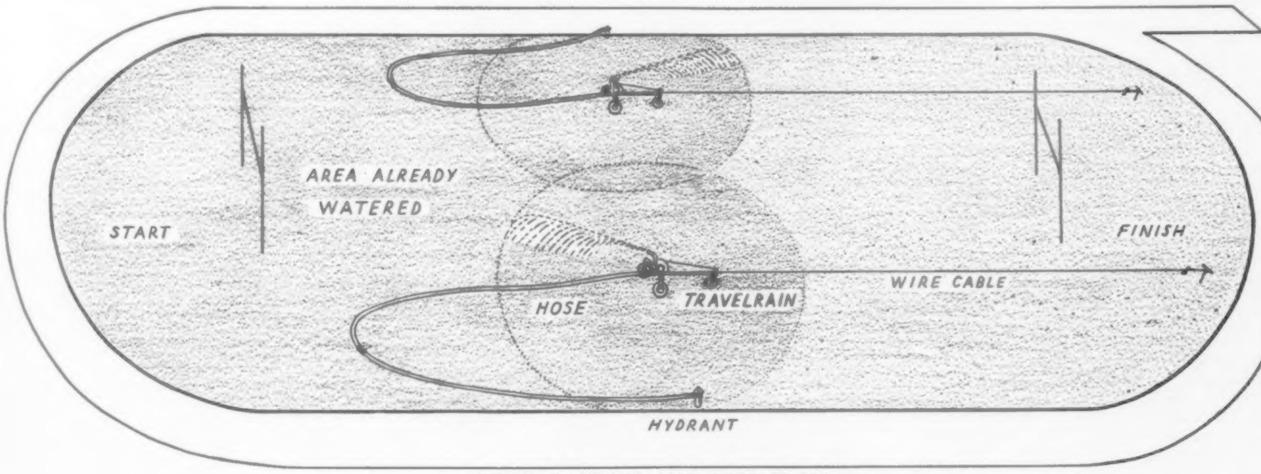
• *Write today to our New York office for special folders on these Columbia products, and for prices and name of your nearest distributor.*

TRAVELRAIN POWER SPRINKLER CO.

Factory and General Offices: 362 N. Canon Dr., Beverly Hills, Calif.

AGENTS IN PRINCIPAL CITIES

New York City, N. Y.
Chicago, Illinois
Seattle, Washington
San Francisco, California
Philadelphia, Pennsylvania
Bethesda, Maryland
Atlanta, Georgia
Indianapolis, Indiana
Springfield, Massachusetts
Shaker Heights, Ohio
Montreal, Canada
Kaanapali, T. Hawaii



FIELD LAYOUT AND PIPE PLAN

A TYPICAL SCHOOL INSTALLATION

FEATURES

- **Better Turf** — Thru equal distribution of water.
- **Lower Costs** — Each unit a self-contained automatic system.
- **Safe** — No sprinkler heads in the lawn.
- **Nite Watering** — Full daytime use of athletic field.

Write for demonstration and illustrated catalog—

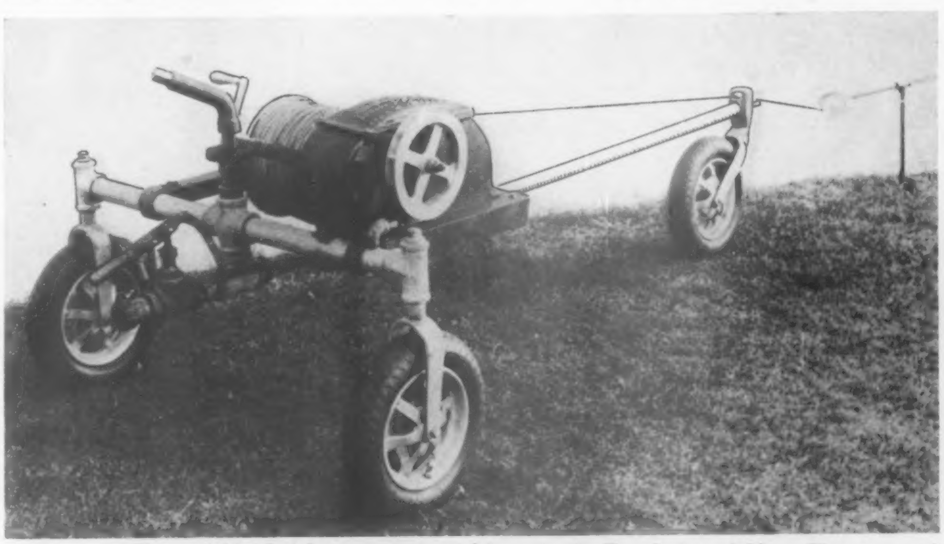
SALES AND SERVICE THROUGH LEADING POWER MOWER DEALERS

Model B Heavy Duty, $170.00

F.o.b. Beverly Hills—Shipping Wt. Approx. 170 lbs.

SPECIFICATIONS

- Waters area 100 x 600 ft. in one setting.
- Gearing runs in oil tight gear box.
- Power developed by water turbine.
- Pulls itself along thru winding up a steel cable.
- Goodyear tires, Roebling cable, Crane valves.
- Shuts off the water automatically.



EXCERPTS FROM A FEW OF THE MANY LETTERS WE RECEIVE:

"With the aid of your TRAVELRAIN sprinkler we established a lawn on our athletic field last spring, and were able to use the field for football last fall. The turf was uniform and thick enough to stand the punishment of both play and practice. Without the use of the sprinkler we would have had to wait a year to get the use of the field, as we could not afford to keep a man just to take care of it and keep it properly watered. The sprinkler has given complete satisfaction.

H. BRUCE SHAWE,
Principal, Douglas County High School,
Gardnersville, Nev."

"The sprinkler has been very successful. We started our football field with it a year ago this spring, used the lawn for football all fall, soft ball and track and field events this spring and it looks very fine now. It has had no irrigation other than that provided by the Travelrain sprinkler. We recommend the Travelrain to any school wishing to turf a football field.

MAURICE NUTTALL,
Principal, Hurricane High School,
Utah."

SECTION VI

PHYSICAL EDUCATION AND ATHLETICS

THE PLANNING OF SCHOOL GROUNDS FOR COMMUNITY USE

By GEORGE D. BUTLER and F. ELLWOOD ALLEN

National Recreation Association

THE community use of school buildings and grounds for recreation and other leisure-time activities has been widely accepted by leaders in the field of education as normal and desirable. Too often the term "community use" has meant merely the occasional restricted use of school property by non-school groups. In modern theory and practice, however, community use is a major function of school buildings and grounds, requiring careful consideration in their design and development.

School Property, a Community Recreation Resource

Present-day conditions and needs make it imperative that school properties be recognized as community recreation resources. The acquisition and development of a system of municipally owned recreation areas to serve the increasing public demand for recreation service cannot be justified if school facilities suitable for recreation use are lying idle during considerable periods. Increasingly, therefore, school grounds are being designed to provide for the varied recreation needs of children, young people and adults throughout the entire year. In some instances this means that facilities are provided that would not be included if these areas were restricted to school use alone. Fortunately, however, much the same areas and facilities are needed in both the school and the community programs, and in general the same fundamental principles apply in designing them for both types of use. The purpose of this article and the accompanying studies is to suggest a few practical considerations in the design of school grounds in order that they may effectively serve both school and community recreation use.

It is impossible, in a brief article, to consider all aspects of the problem of planning school grounds for community use, but attention will be focused on the development of an elementary-school and a high-school site. The accompanying studies are intended merely to illustrate general principles in the design of school grounds, and for this reason they contain few details. Obviously, no standardized plan is possible or desirable. In both plans the location of the school building on the site is indicated, but the building lines are intended merely to suggest the approximate dimensions of the area occupied rather than to indicate the specific size and shape of the building.

Elementary-School Grounds

Leading school authorities have long advocated five acres as a minimum site for elementary schools, and increasingly sites of this size have been acquired. A large portion of the site is commonly developed as a school playground. Each neighborhood served by an elementary school requires a playground designed to serve primarily the varied play needs of children between the ages of five and fifteen, and in general it is desirable that this be at or adjoining the school site. The elementary school playground for the children of the school and neighborhood should therefore afford the diversified types of play opportunities essential to the children's growth and development, whether such opportunities are provided as a part of the regular school program or outside of school hours. The accompanying study for the development of elementary-school grounds is intended to suggest how a five-acre site may be designed for both school and community use.

It will be noted that one corner of the property, comprising about one acre, is devoted to the site of the school building. The various sections of the grounds are arranged so as to afford maximum ease of circulation, to facilitate supervision, and to make possible a wide variety of diversified uses. Much of the area is fenced, and by setting the fence a few feet in from the property line a border planting strip is provided which adds to the attractiveness of the play-

ground and tends to shield the neighborhood from the playground noise.

Serving the Small Children

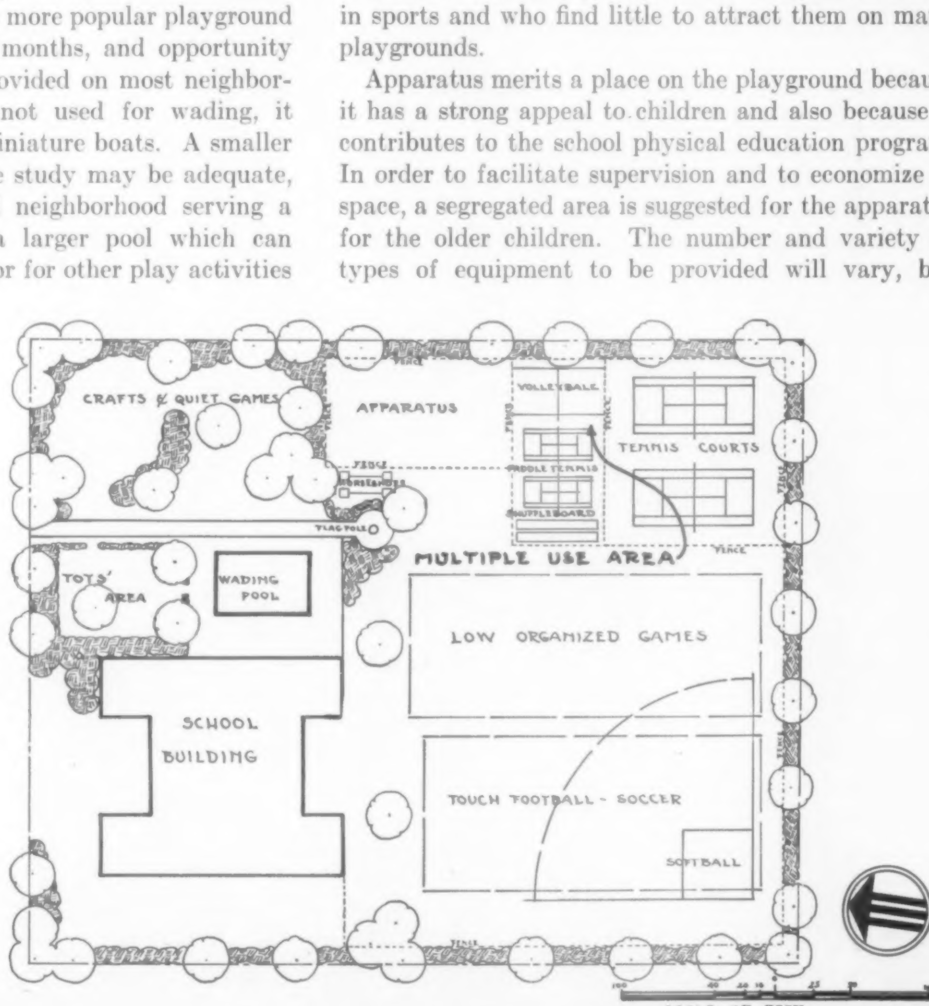
The tots' area is placed near the main entrance to the playground so that small children can reach it easily without crossing sections used by the older children. This area is also close to the school building, an advantage from the standpoint of supervision while the area is being used by the kindergarten, and also because it affords easy access to toilets in the building. Adjoining the tots' area is the wading pool, which is primarily used by the young children. Among the features commonly included in the tots' area are sand-boxes, low swings, slide, and junior junglegym, all of which are exceedingly popular with young children and afford essential developmental opportunities for them. Playhouses make possible many forms of make-believe and social play which have a strong appeal. Benches are appreciated by the mothers who bring their young children to the playground.

If the school grounds were to be developed for school use alone, the wading pool would not be needed. However, there is perhaps no more popular playground feature during the summer months, and opportunity for water play should be provided on most neighborhood playgrounds. When not used for wading, it becomes a pool for sailing miniature boats. A smaller pool than is suggested in the study may be adequate, but in a densely populated neighborhood serving a large number of children a larger pool which can serve as a volley-ball court, or for other play activities during seasons when the pool is not used for wading, may be needed. The paved area surrounding the pool can be used for hopscotch or other games. During certain periods it may serve the small children as a track for their velocipedes and other vehicles.

Facilities for Varied Forms of Play

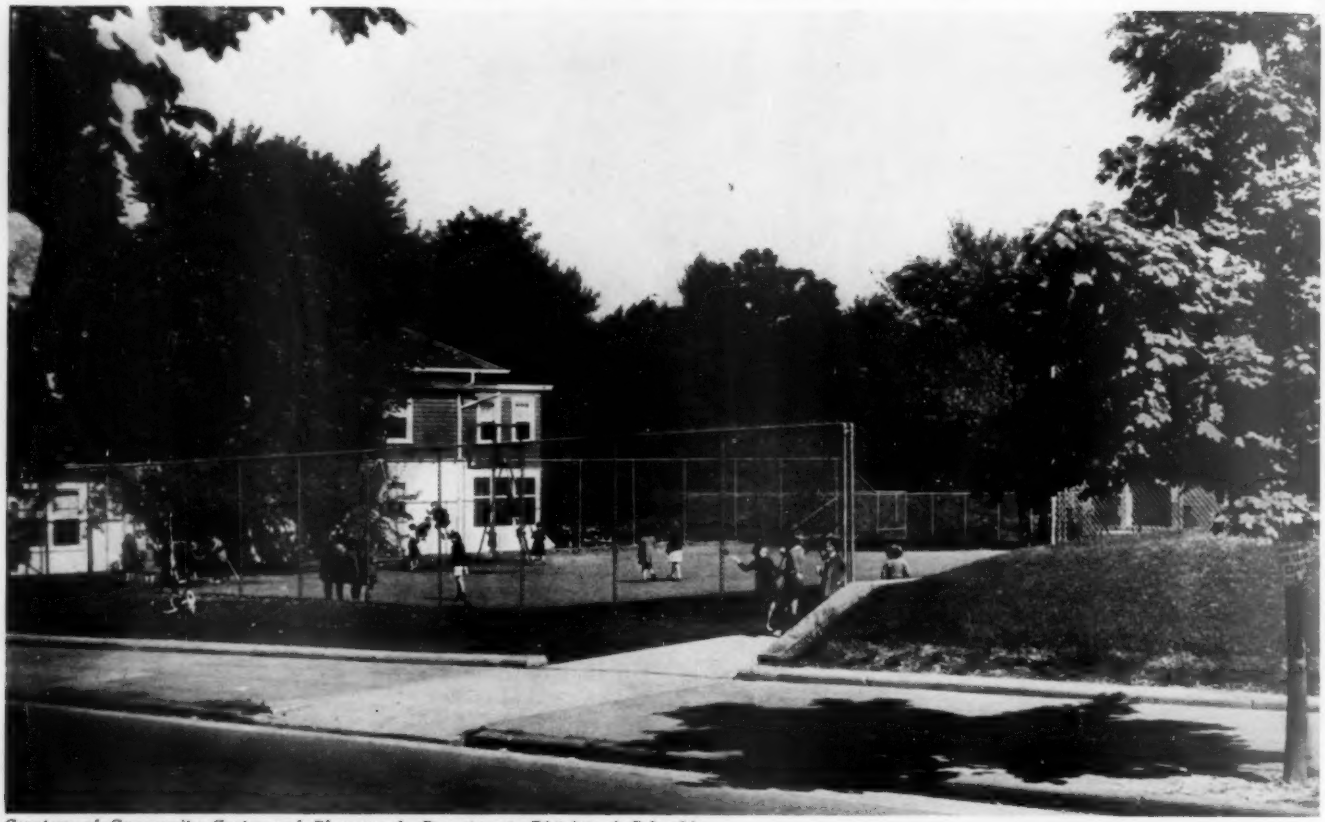
The nearby corner devoted to crafts and quiet games is a feature rarely found on the school playground, but it has limitless possibilities for varied use, both during the school term and in vacation periods. Removing it from the areas used for strenuous and noisy play by large numbers of children enables activities such as story-telling, crafts, dramatics, and other group activities to be carried on without interruption or disturbance. Tables, benches, craft materials, and other equipment needed in this section, may be transferred readily to the school building. A council ring for school and Scout groups, feeding stations for birds, a miniature outdoor theater, a nature museum and an alpine garden are a few of the possible features that can be introduced into this corner. It will appeal particularly to the large number of boys and girls who have no special interest in sports and who find little to attract them on many playgrounds.

Apparatus merits a place on the playground because it has a strong appeal to children and also because it contributes to the school physical education program. In order to facilitate supervision and to economize in space, a segregated area is suggested for the apparatus for the older children. The number and variety of types of equipment to be provided will vary, but



Study for development of elementary school grounds for school and community use

National Recreation Association
F. Ellwood Allen, George D. Butler, Designers



Courtesy of Community Center and Playgrounds Department, District of Columbia

A high boundary fence, separated from the sidewalk by a grass border, provides a safety factor at this elementary school playground. The section shown in the picture is designed for apparatus play and games for the younger children

among those most highly recommended are swings, slide, horizontal ladder, and horizontal bar. A low fence surrounding this area is indicated.

Areas for Games and Sports

Adjoining the apparatus area is the multiple-use area designed for a variety of games. This area requires an all-weather surface in order that it may be available for use throughout the year. Not only the size of this area but also the number and types of game courts laid out on it will vary. This section is used both in connection with physical education class activities and for informal individual and group play. Few sections of the playground receive more intensive use.

In the corner of the area farthest removed from the school building are two tennis courts, which require little supervision except when used for class or group instruction. If these courts are provided with an all-weather surface, they can be used the year round and, like the multiple-use area, can be used for a variety of activities in connection with the physical education program. In sections of the country where ice skating is possible, they may be flooded during the winter months.

A large open area, free from obstructions, has been set aside for games and other play activities for the older age group. This is of the utmost importance because many of the activities appealing to the older boys and girls require considerable space. The area is used primarily for group or team games such as softball or soccer, but it also serves as a field for the flying of kites, for play days, informal meets, and other activities involving large numbers of children. Many playgrounds fail to attract the children in the upper grades because they are not large enough for these popular activities.

The plan suggested here makes possible a diversified program appealing to a wide range of interests and ages, but it by no means includes all the features that merit a place on the elementary-school grounds. Many additional features could well be provided, depending upon local interests and the unusual possibilities afforded by the individual site. In some communities a basketball court may be desirable, either on the multiple-use area or nearby, and equipment for such games as goal-hi and tether ball can readily be provided in small spaces. A section of the grounds, possibly near the school building, may be developed for children's gardens.

Development of High-School Grounds

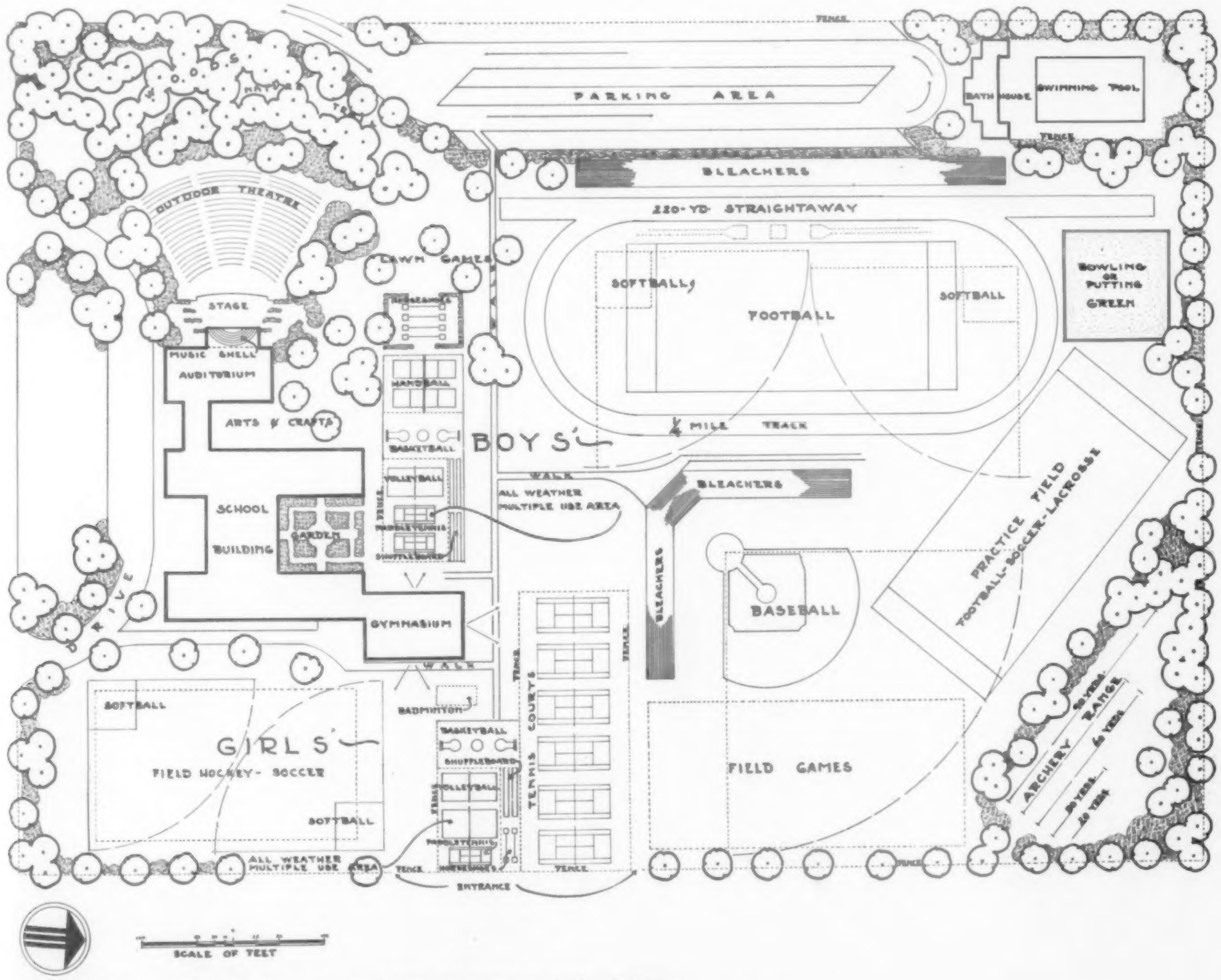
The design of the high-school site gives rise to many different problems than are encountered in

developing a plan for the elementary school grounds, because the two areas differ markedly in size, in the ages of the individuals served and in the type of service to be provided. Twenty acres are considered a minimum for a modern high school site. The grounds provide a variety of features necessary for a well-balanced school physical education program for the entire student body as well as opportunities for cultural and scientific activities connected with the school program. In addition, they provide facilities serving the leisure-time activities of non-school youth and adults, including activities that may have little relation to the school curriculum. They afford the major outdoor recreation center for young people and adults in the section of the city in which the high school is located. The accompanying plan is intended to illustrate the possible development of this type of high-school grounds.

The site in question comprises 25 acres, of which some 4 acres are set aside for the school building and approaches. The remainder of the site is devoted to recreation, parking, or landscape areas. Most of the features suggested in the plan are used in connection with the high-school program, although a few of them, such as the outdoor theater, swimming pool and certain of the game courts, are not commonly provided except on areas that are designed with community use in mind.

Relating Indoor and Outdoor Facilities

In this plan, the development of the school grounds is definitely related to the arrangement of the school-building units. The suggested location of the gymnasium and auditorium has been an important factor in determining the development of much of the area. For example, the gymnasium affords ready access to both the girls' playfield and the major sports areas serving primarily the men and boys. This permits coordination between the indoor and outdoor physical education programs and facilitates the use of the



National Recreation Association, F. Ellwood Allen and George D. Butler, Designers

Study for development of high school grounds for school and community

Courtesy of Community Center and Playgrounds Department, District of Columbia

At this high school site, the natural slope is utilized for bleachers and as boundary for the major game fields that are reached directly by a wide stairway from the gymnasium shown at the left

locker and shower facilities in connection with outdoor activities.

Similarly, the area adjoining the auditorium has been developed in relation to this part of the school plant. A distinctive feature is the band-shell which has been incorporated in the building and which serves as a background for the large outdoor theater. These features can be used for musical, dance, and dramatic presentations by school and community groups, and they are easily accessible to dressing rooms and other indoor facilities provided in connection with the auditorium. Nearby is a section devoted to outdoor arts and crafts groups, separated from the areas devoted to the major active games and sports. The garden in a court of the school building affords an opportunity for observation, rest and study.

Sports Areas

A major part of the grounds is devoted to sports. Among the features meriting attention are the special section set aside exclusively for field sports for girls and the nearby multiple-use area, also intended for their special use. Often the needs of older girls and women are neglected in school and community recreation areas, but in this plan a section of the site is set aside for their exclusive use. The number and types of courts to be developed in it depend upon local interests, needs and traditions, and so far as possible the field and all-weather area should be utilized for diversified activities. Among the sports suggested in the plan are field hockey, softball, badminton, basketball, volley-ball, shuffleboard, paddle tennis and horseshoes.

Other sections of the field will be used jointly by both sexes. For example, a battery of tennis courts serves as a transition area between the girls' section and the major sports area for men and boys. Girls will also make use of the archery range that is suggested for one corner of the site. Incidentally, the border of plantings contributes to safety and also affords a desirable windbreak.

Near the gymnasium is developed an all-weather multiple use area primarily for the use of men and boys. It is quite similar to the comparable area for girls, but it also includes several courts for handball.

Separate areas are provided for football and track on the one hand, and baseball on the other—a desirable arrangement whenever space permits. Often the baseball diamond is laid out within the running track, but this arrangement is not satisfactory because the seating facilities are not ideal for both sports, the skinned diamond extends over the area used for football, the track interferes with baseball play, and while baseball is being played the track cannot be used—a serious disadvantage since the baseball and track seasons are identical. The suggested plan provides for a quarter-mile track with 220-yard straightaway. The area within the track enclosure is used for football in the fall and for softball and other field games during other seasons. Bleachers are arranged so that the sun is at the back of the spectators.

The layout for baseball furnishes an ideal diamond with adequate seating facilities for spectators. During other seasons, however, the field may be used for other sports without encroachment on the skinned diamond. A variety of team games may be carried on simultaneously on the field, owing to its size and freedom from obstructions. In a secluded corner of the field a bowling or putting green is suggested, primarily for the benefit of adults.

Other Features

The outdoor swimming pool is a feature not commonly found on high-school sites, but it is suggested

in the plan. Admittedly, this will be little used while school is in session, but in communities where suitable outdoor swimming areas are not readily available elsewhere, a swimming pool should be included in the community playfield. It will prove a most popular feature during the summer months and will enable the area to provide a well-balanced recreation service. The location in the corner of the site makes the pool easy to reach, segregates the swimmers from others using the field, helps advertise the pool, and occupies space least desirable for school activities. Noise from the pool will not interfere with programs in the outdoor theater.

The wooded area near the outdoor theater affords opportunities for varied development. For example, in this corner of the site a miniature nature trail might be established, or the area might be developed as a bird sanctuary. In some communities a playground for young children in this corner might be desirable so as to afford a place where parents could leave their children while they are engaging in recreation activities on other parts of the site. The area suggested for lawn games can be used for many forms of activity such as croquet, deck tennis, and badminton.

Provision for parking is generally essential on areas that attract large numbers of individuals, many of whom come in their automobiles. The parking area should lead as directly as possible to sections of the area serving large numbers of people. Along the upper side of the high-school site adjoining the football bleachers is a parking area of approximately two acres. This is readily accessible not only to the bleachers but also to the outdoor theater, the baseball grandstand and the swimming pool.

A school and community playfield of this type, developed along the lines suggested in the accompanying study, provides facilities that appeal to young people and adults, and affords opportunities for a well-balanced outdoor recreation program.

A Few Planning Suggestions

A few of the major principles underlying the preparation of a design for a school site to be developed for community use are:

Give adequate consideration to each of the age groups to be served by the area.

Provide facilities that will appeal to people with widely different interests and make possible a diversified program.

Utilize fully the natural resources afforded by the site, such as irregular topography, trees or a brook.

Divide the area for various uses in such a way as to facilitate circulation and avoid interference with activities.

Assure safety by careful selection and placement of suitable apparatus, border and interior fences, location of entrances, and arrangement of features on the site.

Provide for multiple use of areas whenever practicable.

Seek to develop an area that will be attractive and that can easily be maintained in good condition.

In Conclusion

The preparation of a satisfactory plan for an area to serve both school and community recreation needs requires the cooperation and collaboration of school and recreation authorities. Only as the requirements of school and community groups are jointly considered, can a plan be developed that will afford the maximum service to both. Wherever possible, the services of a competent landscape architect should be secured in the preparation of the site plan.

Teachers cannot be expected to instil in children an appreciation of beauty, a sense of orderliness and respect for school property if the school grounds are unattractive, badly planned and improperly maintained. On the other hand, an adequate, well-designed school area becomes at once a source of pride and a center for joyous neighborhood or community life.

THE MORROW HEALTH AND PHYSICAL EDUCATION BUILDING

By G. W. DIEMER

President, Central Missouri State Teachers College

ONE of the attractive, well-planned and up-to-date physical education buildings in the United States is to be found on the campus of the Central Missouri State Teachers College in Warrensburg, Mo. This structure, the Morrow Health and Physical Education Building, was dedicated by Governor Lloyd C. Stark, December 13, 1939. The purpose of the building as conceived by the administration and health and physical education staff of the college is to provide a complete program of health and physical education for the students of a coeducational teachers college with an average enrolment of more than 1,200 college students.

Health and Physical Education Program

Included in this program are the following requirements and activities: annual physical examination and follow-up service; hospitalization services for sickness and accident; six twelve-weeks terms of physical education for all candidates for degrees; courses in hygiene and physiology for all students; comprehensive health and physical education curriculum for majoring students; a broad program of sports, intramurals, and intercollegiate athletics; and a complete program of physical education and health for the pupils of the college elementary and high school.

Planning the Building

To accomplish these purposes, the facilities needed in the building include two gymnasiums, a basketball arena with seats for 2,000 spectators, a swimming pool, a health center, locker rooms, showers, classrooms and special-purpose rooms, offices, laundry, and various other special facilities. The plans as finally approved were the result of an extensive study of physical education buildings on other college and university campuses, of literature regarding physical education buildings obtained from various sources, and advice and counsel from a number of educational experts, including the advisory services of Dr. N. L. Engelhardt, Professor of School Administration and Associate Director of the Institute of Educational Research, Teachers College, Columbia University. The building as finally designed by Walter Boschen, architect, of St. Joseph, Mo., was erected by Winn-

Senter Construction Company, of Kansas City, at a cost of $270,000.

Building Construction

The building measures approximately 183 by 197 feet, rectangular in shape and modern Gothic in design. It stands to the right of the Administration Building and to the left of the Laboratory School, and away from the highways, which means that children from the Laboratory School cross no streets to reach the building.

The sandstone of the structure, quarried three miles north of Warrensburg, came to the campus by way of Kansas City, some fifty miles to the west. The stones formerly made up the old Jackson County Court House, razed the year before. The College desired the stone, since it matched that of the other buildings on the quadrangle. The use of this salvaged stone made possible an estimated saving of $14,000 over the cost of opening up the local quarries or of the use of manufactured stone.

Foundations, footings, and floors are reinforced concrete. The upper walls and roof are supported by a steel superstructure. The roof surface is 20-year bonded tar and gravel. Three-way copper flashing is used at the floor levels and around the building, also at the window and door heads, the top of the roof cant and under the coping. The steel window sash and frames eliminate frequent painting and maintenance.

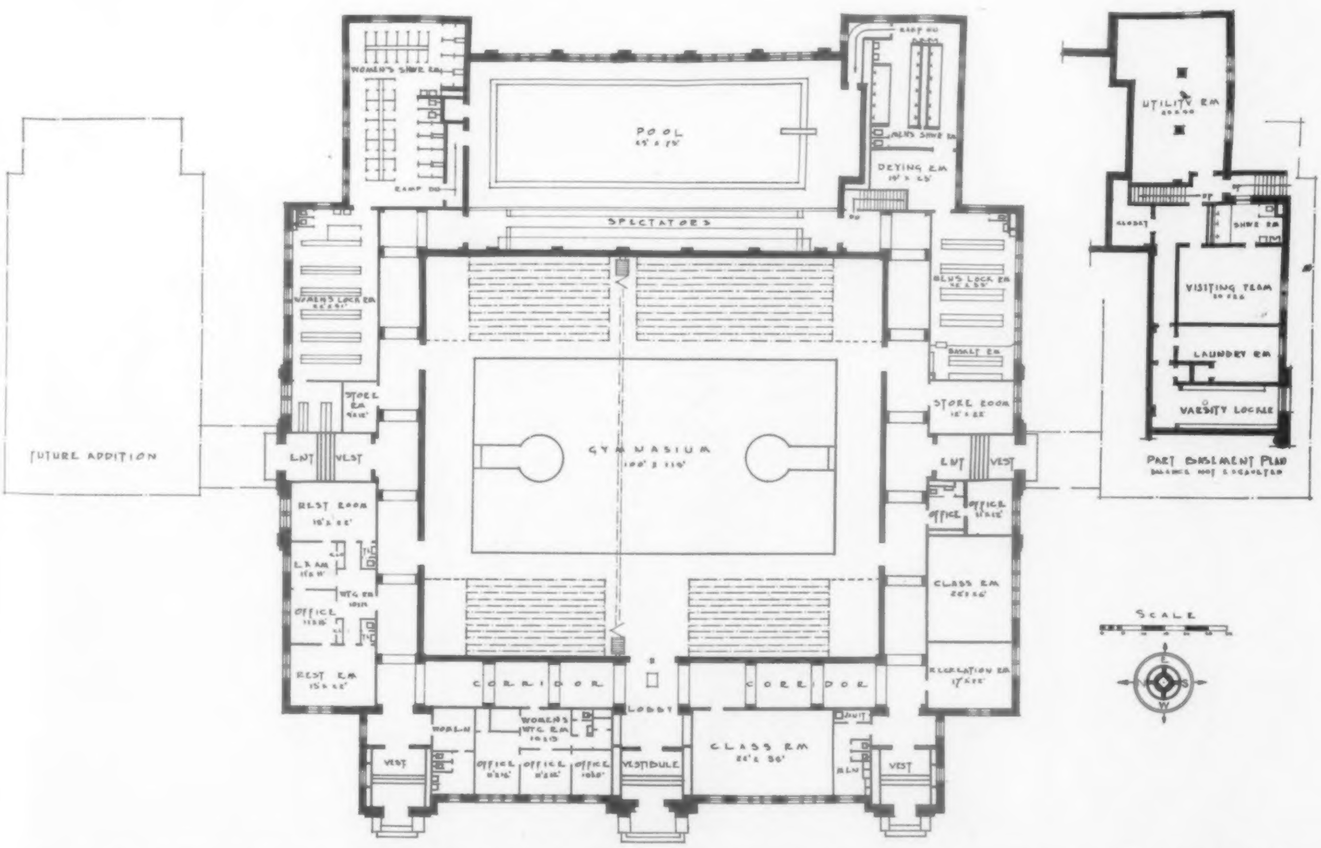
Physical Education Facilities

Two gymnasiums, one for men and one for women, occupy the center of the building. They use a floor space 100 by 114 feet. A sound-proof electrically controlled folding partition separates the two gymnasiums. Physical education classes use these gymnasiums for their class work.

For varsity games twelve rows of telescopic bleachers slide out from the wall to provide seating space for 2,000 persons around a full-sized basketball court. The clearance between floor and roof trusses is 23 feet. The gymnasiums are lighted by a row of windows around the top. Six double doors provide quick exit after games. The building can be emptied in less than two minutes.

Around the central floor on a little more than three sides runs a corridor 10 feet wide. Five double doors provide entry to the building, three being on the front and one each on the north and south.

Across the back of the gymnasiums stands the pool room, which houses a standard swimming pool meas-



The plan of the Morrow Health and Physical Education Building indicates the two gymnasiums, swimming pool, health center, and other special facilities, which provide a complete program of health and physical education for students enrolled in the Central Missouri State Teachers College

The swimming pool measures 75 by 25 feet and has a balcony which seats 200 persons. The walls and runways are laid with ceramic non-skid tile. Acoustic plaster is used for the ceiling. A tunnel surrounds the pool from which pipes and drains may be inspected and leaks detected

The sound-proof, electrically controlled partition separating the two gymnasiums has been folded back to show the basketball arena. Twelve rows of telescopic bleachers, which slide out from the wall, provide seating space for 2,000 persons around the full-sized basketball court

uring 75 by 25 feet, adequate space around the pool, and a balcony which seats 200 persons. The walls of the pool and the runways around the pool are laid with ceramic-non-skid tile. The walls of the pool room have a 7-foot glazed tile wainscot, with an acoustic plaster ceiling. Below, an access or inspection tunnel surrounds the pool. Here leaks from the pool may be detected and pipes and drains may be inspected. The water depth of the pool varies from 3 to 9 feet. Sunlight enters through windows along the entire outside east wall.

Around the other three sides of the corridor are: three classrooms; offices of the Men's Physical Education Department; offices of the Women's Physical Education Department; a health unit; two small storage rooms, public toilets for use at times of varsity games; locker and shower rooms for men and women at opposite ends of the pool; ramps leading down to the floor level of the pool, with footbaths at the entrances to the pool.

Gang showers are used in the men's shower rooms, and both gang and individual showers in the women's shower rooms. Half-lockers are used for physical education classes, with baskets for swimming classes and for laboratory school pupils.

The Health Unit

The health unit, known to the students as the nurse's quarters, is situated on that side of the building away from the street and nearest the other two buildings. This means that the noises from the street do not enter, and provides quiet for the students sent there for rest periods and for the examining physicians when testing the hearing, breathing, and heart action of students. Also, the light from the north windows permits daylight testing of vision.

The quarters of the health unit include five rooms with facilities for the school nurse and the examining physician, and rest rooms for both men and women college students and for laboratory school pupils. Each rest room holds sixteen cots, where those students ordered to rest instead of partaking in strenuous exercise may be sent for the period designated. In the waiting room are shelves of books and magazines dealing with health education.

Other Features

The gymnasium and pool room are heated with steam unit heaters, thermostatically controlled. Rooms and corridors are heated by ordinary steam radiators, all recessed into the walls. A fan exhaust system changes the air in the locker and shower rooms continuously.

A small basement holds, besides the access tunnel for the swimming pool, a boxing and wrestling room, filters and other sanitary equipment for the pool, and the school laundry.

The boxing room makes dressing quarters for the varsity basketball team during the winter season, leaving the classroom quarters for the use of the visiting team.

The filter equipment filters the water in the pool each eight hours, and a daily cleansing with a specially made vacuum sweeper cleans the floor of the pool each day.

All floors other than those in the gymnasium and pool are laid with asphalt tile in shades of red and brown.

PLANNING AND EQUIPPING THE CORRECTIVE-EXERCISE GYMNASIUM FOR THE MODERN COLLEGE OR UNIVERSITY

By GILBERT FREDERICK LOEBS

Director of Health and Physical Education, Colby College

THE modern indoor facilities for our programs of health, physical education and recreation in colleges and universities today have progressed far beyond the stage where one large indoor area, fitted with wall and hanging apparatus, meets the needs of college men and women. The trend today in the construction of indoor physical education facilities is in the direction of providing as many separate activity and exercise spaces as the working budget will permit at the time of construction. Special activity spaces equipped for such purposes as squash, hand-ball, archery, golf, rifle shooting, dance and corrective body mechanics are receiving as much attention in present construction plans as the large gymnasium or the swimming pool.

Planning is essential to assure the avoidance of mistakes and to provide a clear definition of function which should be translated into a definite statement of need or requirement.

Planning Procedure

Three important and distinct steps should be taken by the administrator and the architect before actual excavation or demolition takes place, namely: (1) formulate a statement of need based upon the re-examination of objectives and purposes of the program; (2) develop working drawings that are flexible; and (3) organize specifications from careful review of modern materials and equipment. In the past those interested in new building programs have been very negligent in not providing the architect enough information. The architect should have specific advice and information concerning such matters as the philosophy of physical education, objectives which we attempt to attain, kinds of activities to be conducted within given areas, number of periods per day, number of students to use facilities, terminology used in the profession, and the kind of rooms, with the equipment and fixtures to be used therein.

The following plan is a suggested procedure to serve as a guide in the planning of facilities for the corrective physical education program in colleges and universities:

1. Groups consisting of students, faculty, trustees, physical education experts and maintenance staff should be organized to study the proposed structure and to present their opinions upon the various aspects of the building.
2. Personal visits to existing facilities should be made whereby certain values may be drawn from past experience.
3. A survey of printed materials written on content, equipment and facilities for the college program of corrective physical education should be conducted.
4. A thorough investigation of the findings of the student health records should be made to determine the extent of physical deficiencies discovered in college students.
5. A categorical list of available standards for corrective physical education facilities should be compiled.
6. An estimate of the area and volume of the structure should be recommended upon the basis of number of students using these facilities, number of periods per day it is to be used, and the space requirement for the various activities.
7. The following criteria should be applied to all preliminary plans and sketches while they are in their formative stages:

   a. *Expansibility.*—Provision should be included in all structures for additional units or wings as the need or growth of the student body develops.
   b. *Accessibility.*—The corrective physical education units should be accessible to all persons expected to take some part in the final structure, and also accessible to other important service units.
   c. *Flexibility.*—Allowances should be made for the multiple use of space wherever possible, and to provide for a large number of various activities.
   d. *Orientation.*—The final selection of the place where the corrective physical education room will be located should provide for complete articulation with other indoor and outdoor facilities.
   e. *Safety.*—Provisions for safety measures affecting both participants and instructors, particularly where wall or overhead apparatus is to be installed, should receive considerable thought.

f. *Entrance and Exit.*—Adequate entrances and exits should be considered in relation to the maximum use of the planned facilities.

g. *Building Code.*—Building standards as reflected by the State Departments and various professional organizations should be applied.

Standards for the Construction of the Corrective Physical Education Gymnasium

Hughes defines a standard "as a measure of quality or quantity which has been proposed by authorities, accepted by experts, or established by scientific facts or by general usage and consent." [1] The standards which appear in the following presentation are based not solely on the judgment of the author but on the research and experience which are available in the professional literature. It is not claimed that all standards for corrective physical education facilities are included, or that all standards proposed are applicable to all situations. Standards should not be considered as fixed for all times, or a cure-all for individual construction problems. Standards "will change because education in our society is constantly subject to change and the school plant must constantly adapt itself to its needs." [2] Studies have been conducted to determine and evaluate standards and policies in the administration of physical education,[3] standards for college buildings,[4] and to some extent the specifications for physical education buildings,[5, 6] The following standards constitute an attempt to formulate a summary of the recommendations based on present available information covering size, shape, floors, walls, ceilings, windows, heating, lighting, ventilation and other details in the planning of the corrective physical education gymnasium or body mechanics laboratory.

Location and Accessibility.—The corrective physical education gymnasium should be preferably located on the ground level above the natural ground level of the plot, or on the second-floor level of the structure, but never in the basement below the ground level. The long sides of this room should be exposed to the sunlight and direct ventilation. It is recommended that the room designated for this phase of the physical education program be located adjacent to the large or main gymnasium floor area, the health service or health examination rooms, the locker rooms (if on this same level) or the departmental offices.

[1] Hughes, W. L.: "The Administration of Health and Physical Education for Men in Colleges and Universities." Bureau of Publications, Teachers College, Columbia University, New York. 1932. p. 4.

[2] Strayer, G. D.; and Engelhardt, N. L.: "Standards for Elementary School Buildings." Bureau of Publications, Teachers College, Columbia University, New York. 1933. p. 1.

[3] Hughes, W. L.: Op. cit., entire book.

[4] Evenden, E. S.; Strayer, G. D.; and Engelhardt, N. L.: "Score Cards and Standards for College Buildings." Bureau of Publications, Teachers College, Columbia University, New York. 1938.

[5] "Physical Education Buildings," Part I, "Gymnasium and Lockers," prepared by the Society of Directors of Physical Education in Colleges. 1923. Dr. G. L. Meylan, Chairman.

[6] "Trends in Physical Education Facilities and Gymnasium Construction." Report of the Committee on Construction and Material Equipment, A. R. Winters, Chairman, The Society of Directors of Physical Education in Colleges, Proceedings, 1929. p. 41.

Courtesy of the Fred Medart Manufacturing Co.

Above—A combination gymnasium-auditorium stage may be equipped for a corrective program

Left—Corrective Physical Education Gymnasium at the University of Southern California

Size of Floor Area.—The room designated as the special exercise or corrective physical education gymnasium should approximate a floor area of 30 x 50 feet. Williams and Brownell suggest that gymnasiums for this purpose should be about 25 by 50 feet in size,[1] while Evenden, Strayer and Engelhardt recommend the following: "The size of the room should be at least 25 feet by 50 feet. However, the number and size of the corrective rooms required should be determined by allowing 50 square feet for each student requiring corrective treatment with regard to the number of treatments per week."[2] The following factors should be considered in determining the dimensions or size of the floor area in any plan for the special exercise or auxiliary rooms adjacent to the main gymnasium floor itself:

Scope of the required corrective program
Size of the classes
Number of periods required per week
Scope of the optional corrective program
Size of present as well as future enrolment
Use of the room by both men and women
Public usage of these facilities
Amount of apparatus to be installed

It is more satisfactory in coeducational institutions to provide separate gymnasia for men and women because of the various types of activities and the reduction of time available to each group. In the preliminary sketches and consideration of the special exercise rooms provisions should be planned whereby a maximum of expansion is possible for the future needs of the institution.

Ceiling.—The height of the corrective physical education gymnasium should be not less than 12 feet and preferably 15 to 18 feet. Ceilings should be free from obstructions and pipes, and should be so constructed as to favor the proper acoustical treatment. Smooth, non-gloss plaster is highly desirable, with allowance made for frequent cleanings, and should be capable of repainting, since natural or artificial light reflection is an important factor in this room.

Floors.—The top floor should be high-grade maple (hardwood) 7/8-inch to 1 1/8-inches in width and 3/4-inch thickness. Maple flooring should be tongue-and-grooved, well seasoned, long lengths, free from knots and relatively straight-grained.[3, 4] Birch, hard pine, oak and wood blocks are also used but are not preferable to maple. Considerable preference to floor coverings of linoleum or congoleum for the corrective physical education gymnasium has been expressed in recent years by experts in this field because of the ease and efficiency of cleaning along with safety factors involved. Sleepers or girders should be imbedded in the concrete base of the building, and there should be a sub-floor of hard pine constructed diagonally to the top flooring. Felt pads should be laid between the sub-flooring and the top floor, and there should be waterproof material to protect the structure from moisture. This should increase the resiliency of the floors and prevent sound reverberations.[1]

Boiled linseed oil, turpentine and Jap Dryer are highly recommended as a finish to the new maple floor after the complete process of sanding the surface is finished. All excess oil should be taken off the floor before it cools. It is recommended that when linseed oil is used, small areas should be covered at a time and the oil rubbed well into the wood. A Phenolic resin or bakelite finish has also been recommended because "it is weather-resistant, waterproof, alkali-resistant, will not rubber-burn, is not slippery, and will retain its gloss."[2] Commercial floor wax, non-skid and color treatment should be carefully examined and analyzed before its adoption for the corrective exercise floor. Where the corrective or special exercise room is adjacent to the main gymnasium floor, the floors should be continuous without a break or threshold, and if these rooms are separated by folding or sliding doors, they should then close off the entire space. Where permanent floor markings are desired on the corrective exercise floor, the paint used for such purposes should contain a mixture of dye to prevent rubbing off.

Walls.—Impervious glazed brick is highly desirable for the interior walls of the corrective physical education room. The finish should reflect the light without glare; neutral colors are preferable. There should be a smooth finish on the walls of the gymnasium to protect students from injury. The glazed brick should extend at least 8 to 12 feet from the floor level, and if other material is used, beyond this point, it should be so constructed as to decrease noise and sound reverberations. Destructible materials such as plaster, stucco or any rough surfaces are not desirable. These are hazardous, and catch dust or chip off. Wooden wall finishings are not fireproof. Projections from the walls within 8 feet of the floor level should be avoided. The corners connecting the walls and floors around the entire exposed area should be finished with at least a 3-inch metal or angle-iron to assist in cleaning. The structure and type of equipment to be installed in the corrective exercise room should be considered before the actual construction of the walls takes place, so that the necessary wall and ceiling appliances can be located in the fundamental structure. Balance beams, climbing ropes, chest weights, stall bars, mat hangers, horizontal bars,

[1] Williams, J. F.; and Brownell, C. L.: "Administration of Health and Physical Education." W. B. Saunders, Philadelphia, Pa. 1937. p. 346.
[2] Evenden, E. S.; Strayer, G. D.; and Engelhardt, N. L.: Op. cit., p. 169.
[3] Williams, J. F.; and Brownell, C. L.: Op. cit. p. 341.
[4] Evenden, E. S.; Strayer, G. D.; and Engelhardt, N. L.: Op. cit. p. 166.

[1] "Physical Education Buildings." Op. cit. pp. 20-22.
[2] Copp, H. W.: "Care of Gymnasium Floors." *Journal of Health and Physical Education.* February, 1938 p. 94.

mirrors and other specialized equipment adapted to this particular type of program should be located in the early working drawings of the architect and approved by the instructors who are to utilize both the space and the equipment for their teaching. The wall plans for the corrective physical education gymnasium should allow for ample free flat wall space to be used for various purposes in the instructional program and not covered entirely with wall apparatus or appliances which will prevent adequate open wall space.

Windows.—The window area should be at least 25 per cent of the floor area in the modern gymnasium structure.[1] Windows should be at least 8 feet above the floor level in order to utilize the wall surfaces under them for apparatus, appliances and for activities.[2] Windows should be placed on one or both of the long sides of the gymnasium, preferably the north and south to avoid the sun glare during the afternoon periods. Windows placed in the end walls or side walls and subject to direct sun rays should have the type of glass which diffuses the light and protects the eyes of the instructor and students from glare. All windows in the gymnasium should be the pivot or louvre type, mechanically operated.[3] Windows subject to breakage should be protected by wire screens from the inside, flush with the walls and accessible to operation without moving the screen.

Heating.—The temperature in the gymnasium should be regulated by thermostatic control. "The temperature of the gymnasium taken at 3 feet above the floor level should be 60 degrees F. to 65 degrees F. with a relative humidity varying from 40 to 60 per cent. Air motion should not exceed 50 feet per minute velocity."[4] The recommendation of the New York Commission on Ventilation for gymnasia is 65 degrees F. as an effective temperature.[5] The corrective physical education gymnasium should have its own thermostatic control separate from the control of the main gymnasium and other facilities, since there may be certain times that the temperature of this room will need to be adjusted from the recommended standard.

Steam heat or hot water is recommended above hot air for the corrective exercise gymnasium. All radiators should be recessed in the walls if lower than 8 feet from the floor level, and should be protected by wire screens. Any heating system installed in the gymnasium should be simple to operate, and such systems should have all elements automatically controlled. Heating systems should be installed in accordance with the state building codes and those prescribed by the American Society of Heating and Ventilating Engineers.

Ventilation.—Natural ventilation of the gymnasium is far superior to, and more economical than, mechanical forms of ventilation in initial cost and cost of operation. Sufficient natural ventilation is highly desirable and of utmost importance in developing the early plans and specifications of the gymnasium. Natural ventilation, however, should be supplemented by some plan of fan system and exhaust mechanically operated and automatically controlled.[1] The standard for fresh air in the gymnasium as recommended by the Society of Heating and Ventilating Engineers is 1.5 cubic feet of air per minute per square foot of floor area.[2] "Mechanical ventilation systems should provide sufficient fresh air to eliminate odors under conditions of greatest load."[3] It is further recommended that "the source of the air supply for mechanical systems should be above the ground level and as free as possible from any contamination from dust or odors of streets, chimneys, or toilet vents. If dust and soot cannot be avoided, the air should be filtered or washed."[4] All ventilators should be recessed and flush with the walls of the gymnasium and protected by wire or iron guards and located above the floor level. McClure's study[5] should be reviewed by all administrators in the formulating of plans for ventilating systems in the gymnasium.

Lighting the Gymnasium.—Natural lighting in the gymnasium should be supplemented by sufficient artificial lighting. A diffused type of artificial lighting appears to be preferable to direct lighting in the gymnasium. In all instances artificial lighting in the gymnasium should attempt to avoid shadows and glare in the eyes of the participants in the room. Ceiling lights should not be above trusses, in order to prevent floor shadows. Ceiling lights should be arranged for repair without the use of scaffolds, and fixtures should be the non-dust-collecting type. Porcelain, white enamel, x-ray and Cahill are the more favored type of reflectors. All artificial exposed lighting in the gymnasium should be protected by wire cages and consist of non-breakable glass. The National Electrical Manufacturers Association recommends 15 foot-candles at the floor level as the minimum standard of artificial illumination for the gymnasium.[6]

Drinking Fountains.—Drinking fountains should be

[1] Evenden, E. S.; Strayer, G. D.; and Engelhardt, N. L.: Op. cit. p. 169.
[2] Klauder, Charles Z.; and Wise, Herbert: "College Architecture in America." Charles Scribner's Sons, New York. 1922. p. 224.
[3] "Physical Education Buildings," Part I, op. cit. p. 16-17.
[4] Evenden, E. S.; Strayer, G. D.; and Engelhardt, N. L.: Op. cit. p. 168.
[5] New York Commission on Ventilation: "School Ventilation—Principles and Practices." Bureau of Publications, Teachers College, Columbia University, New York. 1931.

[1] Evenden, E. S.; Strayer, G. D.; and Engelhardt, N. L.: Op. cit. p. 168.
[2] American Society of Heating and Ventilating Engineers, headquarters at 51 Madison Avenue, New York.
[3] Evenden, E. S.; Strayer, G. D.; and Engelhardt, N. L.: Op. cit. p. 168.
[4] Ibid: p. 26.
[5] McClure, J. R.: "Ventilating of School Buildings." Bureau of Publications, Teachers College, Columbia University, New York. 1924.
[6] Report of the National Electrical Manufacturers Association, American School and University, Vol. 9, 1937. p. 276.

installed at convenient places in the gymnasium. These should be of vitreous china material,[1] recessed into the walls, with no projection beyond the surface of the wall. Hughes states that these should be the "type in which the stream of water issues from the jet placed at the side of the bowl at an upward angle of 45 degrees. The water should reach its highest point in the center of the bowl, so that the water which touches the lips does not flow or fall on the orifice from which the water issues or become mixed with the fresh water." [2] Controlling levers should be outside the fixture itself, but not as an obstruction on the wall, and should be the automatically closing type.

Doors—Entrance and Exit.—"In constructing a gymnasium, careful attention should be given to the doors used by the students and spectators. Doors leading to the gymnasium from locker rooms should be of the single type, to prevent accidents. If locker rooms are on the same level as the gymnasium, the doors should swing out or away from the playing area. The reverse is true where lockers are located beneath the gymnasium; here it is better to have the doors swing away from the stairs or into the gymnasium. The glass in these doors must be of non-shatter type, and preferably covered by a mesh or iron grating." [3] The single type doors in the corrective physical education gymnasium should be approximately 3 feet by 7 feet to facilitate the moving of apparatus or pianos from other auxiliary rooms or the main gymnasium floor. Doors leading to the interior of the building should not have thresholds.

[1] Thomas M. W.: "Public School Plumbing Equipment." Bureau of Publications, Teachers College, Columbia University, New York. 1928. p. 81.
[2] Hughes, W. L.: "Administration of Health and Physical Education in Colleges." A. S. Barnes Co., New York. 1935. p. 294.
[3] Williams, J. F.; and Brownell, C. L.: Op. cit. p. 344.

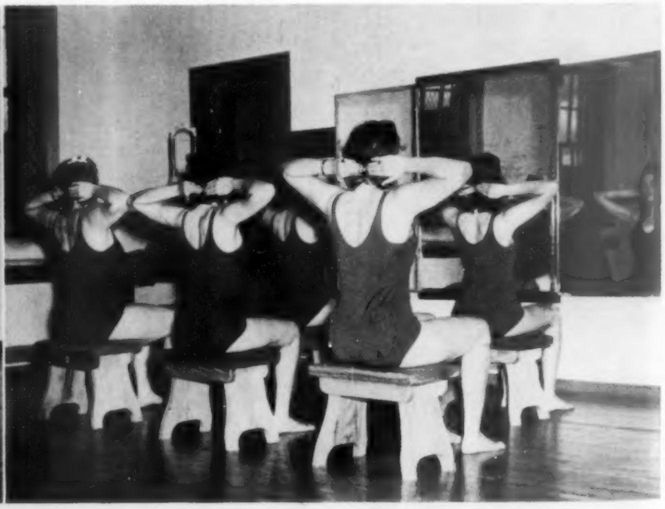
Approved exits, the number and types, as required by the state fire regulations, should be planned. These should be clearly marked and well lighted to designate doors leading to the outside. Exits should be sufficient in number to provide movement without congestion or crowding during the periods of maximum capacity or peak load of the room.

Skylights.—Top lighting, or skylights, are dependent upon the climatic conditions in which the gymnasium is to be erected. Skylights in the gymnasium may be of a variety of type and design; the lantern type of skylight appears to be most frequently constructed. This diversity of forms makes it impossible to treat the roofs of the gymnasium in certain traditional ways of other buildings on the campus. Where skylights are included in the building plans, Winters states the following: "On the basis of total floor area, the median allowance for skylight is 12 per cent." [1] Leakage, loss of heat, condensation, breakage and hot spots on the floor area are some of the factors which make this unit unsatisfactory in most gymnasium construction.[2]

Service Rooms.—In the preliminary study and plans for the corrective physical education gymnasium, provisions should be made for the following auxiliary or service rooms in relation to the scope of the program to be conducted. In addition, consideration should be given to the location of these service rooms in relation to the plans for other units in the total indoor physical education facilities.

a. Photographic or silhouette room
b. Dark-room for developing pictures
c. Rest rooms
d. Examination rooms
e. Instructor's office

[1] Op. cit., p. 46.
[2] "Physical Education Buildings," Part I: Op. cit. pp. 15-17.

Courtesy of Miss Marie Haidt

In the Corrective Physical Education Gymnasium, Women's Division, the Pennsylvania State College, mirrors are used to check progress in learning correct posture.

Courtesy of Miss Katherine F. Wells

Equipment used in the program of the Corrective Physical Education Gymnasium at Wellesley College

Courtesy of Lawrence LaBree

Wall apparatus in use in the Corrective Physical Education Gymnasium at Purdue University

f. Storage closets
g. Apparatus room
h. Shower, dressing and toilet room for instructor
i. Hand-washing facilities for students
j. Shower and dressing rooms for students

The apparatus or equipment for the corrective physical education gymnasium can be fairly simple or extremely elaborate, dependent upon the scope of the program and the number of students to be reached. The training and understanding of the instructional staff should also serve as criteria in the selection of equipment. A large number of mechanically operated appliances is unnecessary. A careful study of present practice and the opinions of experts in this field, and a thorough examination of the equipment to be used by both the student and the instructor, should be made before final plans of the building are sanctioned, and before any purchase of equipment is made. Considerable expense, delay, rearrangement of floor plans, and inconvenience, can result if the selection of equipment is made after the building has been completed.

Check-List of Equipment

The following list of equipment and apparatus for the corrective physical education gymnasium is presented under three categories (Essential, Highly Desirable, and Desirable) to serve as a check-list for the college administrator in formulating the initial plans for the new building.

A. *Essential*
- Stationary wall mirrors, 26 x 40 inches
- Movable, full-length triplex mirrors
- Stall bars
- Gymnasium benches or stools with padded seats
- Mats, various sizes, painted with waterproof paint for easy cleaning
- Tilted foot boards
- Hyper-extension pillows with removable covers for laundering
- Rings with individual adjustments
- Mat hangers, or mat trucks
- Scales
- Posture photography apparatus
- Silhouettograph
- Victrola equipped with records
- Display rack and display boards
- Steel storage cabinets

B. *Highly Desirable*
- Movable massage plinths
- Balance beams or balance boards
- Adjustable horizontal bars
- Chest weights and quarter-circle pulley weights
- Anthropometric equipment
- Anatomical models
- Pedograph (for making footprints)
- Wooden wands
- Dumb-bells (wooden and iron of various weights)
- Small sand bags or bean bags

C. *Desirable*
- Climbing ropes
- Rowing machine
- Wall parallel bars
- Combined horizontal and inclined ladder
- Boom
- Double wrist machine
- Frictional resistance machine
- Electric horse
- Stationary bicycles
- Medicine balls of various weights
- Moving-picture projector and screen
- Blankets
- Rag rugs to be placed on the floor
- Steel filing cabinets

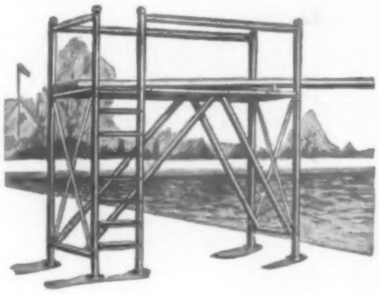
MITCHELL MANUFACTURING CO.

Milwaukee, Wisconsin

Playground Apparatus
Beach and Pool Equipment
Fold-O-Leg Tables and Benches

"Betterbilt"

Folding Choral Elevations
Folding Band Elevations
Sanitary Barn Equipment



FOR THE SWIMMING POOL

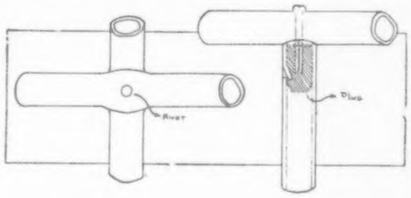
DIVING BOARDS
WATER SLIDES
LADDERS
TOWERS
STANDS, Etc.

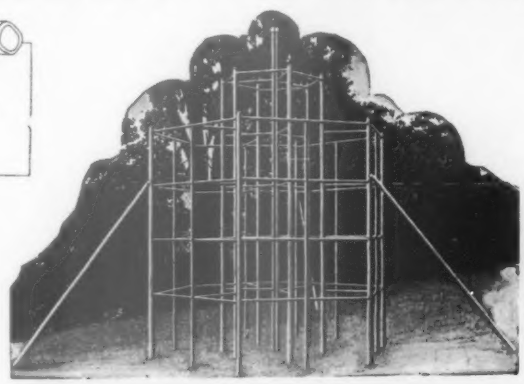
Mitchell Laminated Diving Boards are specially treated and guaranteed. Eliminate seasonal experimentation by trying just one of these boards. Write today for Booklet No. 2.

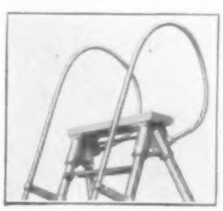
Safety THE IMPORTANT FEATURE OF ALL MITCHELL "BETTERBILT" APPARATUS

SAFETY FITTINGS

Special Design eliminates exposed bolt ends and nuts on Mitchell Climbing Gyms and Pool Equipment. Extra-rigid, strong, foolproof corners and joints cannot possibly injure children or tear clothing.







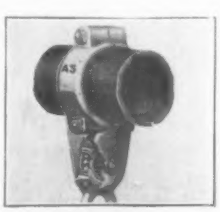
SOLID STEPS, HEAVY GUARD RAIL

Steps on all slides are made of heavy malleable iron, perforated for safety. Guard rails correctly designed and well braced.

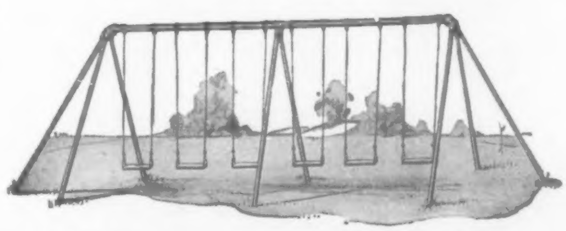
MITCHELL ALL STEEL SLIDES ARE SAFE AND ECONOMICAL

CLIMBING IS INSTINCTIVE FOR MOST CHILDREN

Every playground device in the complete "Betterbilt" line reflects the many years of study devoted to the physical welfare and wholesome amusement of boys and girls — Tomorrow's Citizens. Write today for Booklet No. 1.



Mitchell Swing Hanger



Mitchell Swing Outfits are equipped with hangers which have extra bearing surface—increasing life of chain and hooks. Heavy malleable iron of extra tensile strength.

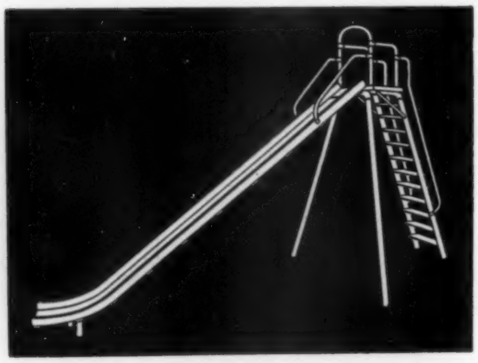
BOOKLETS
(Illustrated)

1. "Betterbilt" Playground Apparatus
2. "Betterbilt" Pool Equipment
3. Fold-O-Leg Tables and Benches
4. Folding Choral Elevations
5. Folding Band Elevations
6. Sanitary Barn Equipment

RECREATION EQUIPMENT CO.

Manufacturers of Play Equipment for Playgrounds, Parks, Pools and Beaches

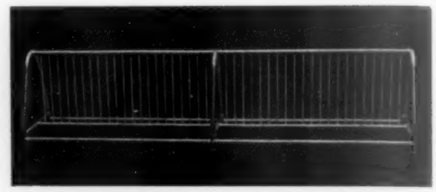
724-26 West Eighth Street, Anderson, Indiana



SLIDES

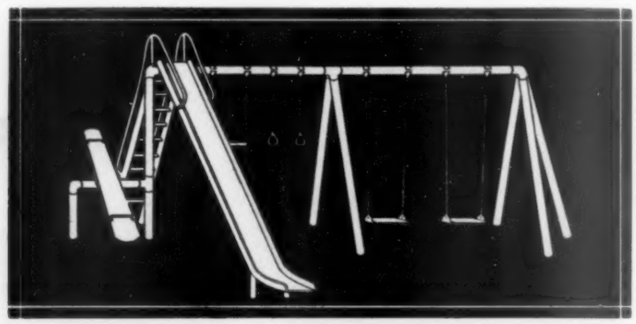
A great variety of slides is offered, both as to size and nature of construction. Be sure to investigate our all-metal slides with stainless steel bedway.

THE RECREATION LINE



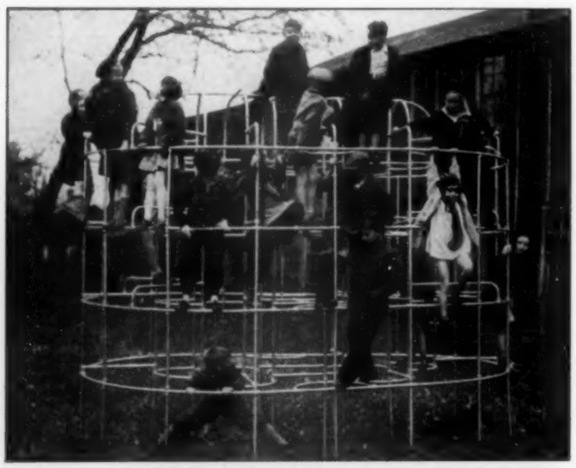
BICYCLE RACKS

Several different types and sizes, hot galvanized steel and malleable throughout. Either duplex or single-side design.



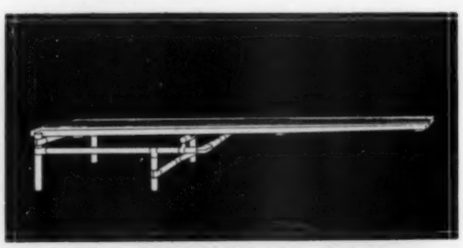
GYM COMBINATION

This is our No. 429. We have many other combinations.



MONKEY JUNGLE

This "Monkey Jungle" is the king of all climbing devices. Many other styles and sizes available.



DIVING BOARD OUTFITS

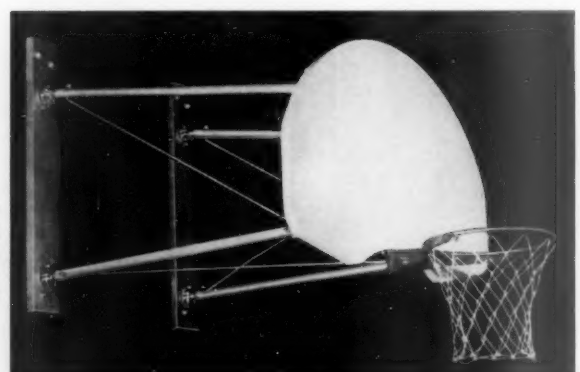
The one shown is a one-meter official and regulation outfit, with overhanging frame. Many other types available.

FOR THE PLAYGROUND

Swings, Slides, Merry-go - rounds, Climbing Gyms, See - Saw Sets, Ocean Waves, All-Metal Tennis Net Outfits, Park Settees, etc.

FOR BEACH AND AND POOL

Diving Board Outfits, Pool Ladders, Slides, Life Guard Chairs, Pool Cleaning Equipment, Diving Mask Outfits, Footbath Trays, Cocoa Matting, etc.



BASKETBALL BACKSTOPS

The one shown above is the new fanshaped type with mounting for attachment to the wall. This type is also used with the portable frame and also the swing-up frames.

THE RECREATION LINE

FOR THE GYMNASIUM

Basketball Frame of Wall, Swing-up and Portable Types complete. Backboards. These are 4' by 6' rectangular, of plywood or all-metal, or new all-metal fanshaped type with special goals.

SEND FOR FREE CATALOG

THE RECREATION LINE

FRED MEDART MANUFACTURING CO.

3568 Dekalb St. St. Louis, Mo.

Manufacturers of

Gymnasium Apparatus—Basketball Backstops—Telescopic Gym Seats—Automatic Electric Scoreboard and Timer—Steel Lockers—Steel Wardrobes (The Lockerobe)—Steel Shelving

MEDART *Telescopic* GYM SEATS

with Floating Locomotion

Outstanding among the many features of this modern seating is the ease with which seats glide in and out of the "nested" position, in one operation. Use of the telescope principle eliminates the need for any counterbalance mechanism (springs) and consequently there is nothing to lift up or to pull down; no closure panel and no possibility of any parts of the seat falling on the operator. Understructure is of steel; all lumber parts are full length (not pieced) and are of substantial thickness (even the risers are solid, full length selected lumber—no flimsy material used anywhere in the construction). When Medart Gym Seats are installed in a gymnasium it is possible to quickly and easily provide a bench with a comfortable back rest for dances or special classes of instruction by simply withdrawing the one (lower) row of seats from the "nested" position, thus eliminating the need for folding chairs or other auxiliary seating. Medart Gym Seats are fully approved and recommended by the structural engineering department of one of our leading universities as a result of an exhaustive analysis and of actual tests made by these authorities.

Write for Gym Seat Catalog GS-3

GYMNASIUM APPARATUS AND BASKETBALL BACKSTOPS

Medart Gymnasium Apparatus which is today acknowledged as the ultimate in gymnastic apparatus perfection, is the result of continuous, uninterrupted manufacture and constant improvement, since 1873. . . . Likewise the Medart line of Standard and Special Basketball Backstops has kept pace with the growing popularity of this sport. Interested parties are invited to avail themselves of the competent services of the Medart Installation Engineers.

Write for Gym Catalog G-4 and Backstop Catalog BB-2

MEDART AUTOMATIC ELECTRIC SCOREBOARD AND TIMER

Precision built throughout. Streamlined, of all metal construction, the Medart Scorer and Timer weighs only 90 lbs. and is 74" long, 42" high and 5" deep. Black wrinkle finish surface with aluminum border. Translucent clock face of 27" diameter available with 8-minute quarters or 20-minute halves. Lighted (white) from rear until last minute of play when clock face automatically changes to bright red. Clock operates on 110 volt, 60 cycle synchronous movement and is equipped with positive "dead stop" brake; stops automatically and sounds extra loud, vibrator-type horn at end of each period. Easily read scoring numerals (6-8 volt lamps with aluminum reflectors) are 8½" high, instantaneously registering (0 to 99) from single scoring and timing control box (size 6" x 11⅛" x 2½"). Control box furnished with 15' of cable and 10-terminal connector plug. Many other desirable features. Write for Complete Information.

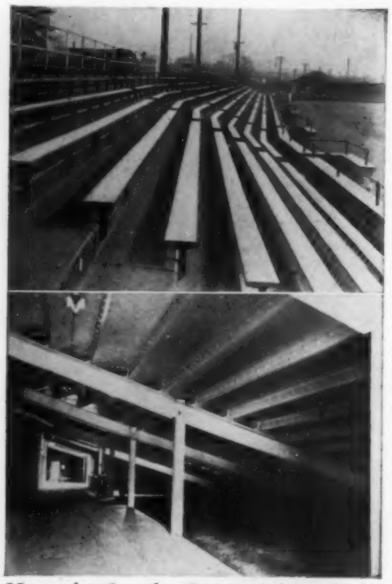
PITTSBURGH - DES MOINES STEEL COMPANY

3425 Neville Island, Pittsburgh, Pa.
Room 994—270 Broadway, New York
1215 First National Bank Bldg., Chicago

924 Tuttle Street, Des Moines, Iowa
1224 Praetorian Bldg., Dallas, Texas
614 Rialto Bldg., San Francisco, Calif.

Steel Deck Grandstands

The following information is presented for its usefulness in suggesting a long-range planning program for better outdoor seating. These P-DM products are not available during the national emergency.



Note the Sturdy Construction of the Deck and Supports — Clearly Illustrated in the Two Close-up Views. Substantial Handrails Surround the Stand, and May Also Be Installed to Divide It Into Sections

Pittsburgh-Des Moines Steel Deck Grandstands are used in all types of athletic fields and for indoor arenas. They are built in standard sections 18 feet long by 10 rows deep, each section seating 120 people. A stand may be any number of sections long by any number of sections deep. Its seating capacity may be increased from time to time, double decked if necessary, and no matter how often enlarged it will always present a neat and finished appearance. A roof may be provided over all or a portion of the stand.

The wood seat planks supported on cast iron or welded steel stools are securely bolted down to the deck. Other types of seats are furnished if desired. Aisles, at proper intervals, extend from front to back with walkways along the front or back if necessary. Entrance or exit is accomplished by means of stairs or ramps at the lower end of each aisle, or through wells in the stand.

The steel deck is built to shed water. Hence the space under the stands may be utilized for dressing rooms, toilet facilities, storage, etc. In a number of instances masonry walls have been built along the ends and back so as to totally enclose the space under the stands.

These stands are permanent. They do not weather, rot or decay and therefore will not weaken and collapse. Their first cost is low, and they have a high salvage value. Being assembled by means of bolts, they can be dismantled and re-erected at another location—a feature not possible with other types of construction. An occasional coat of paint, the only maintenance necessary, keeps them looking new year after year.

Write our nearest office for our latest "Steel Deck Grandstands" Bulletin, and any additional information you may desire for future planning.

Louisiana State University Division at Monroe, La. Masonry Enclosure. Seating Capacity, 4000

Southwest Stands — Penn State, State College, Pennsylvania, Seating Capacity, 8160

Waterbury, Connecticut, High School. Masonry Enclosed Sides and Rear. Seating Capacity, 4400

All-Steel Swimming Pools

Summit Hotel, Uniontown, Pennsylvania P-D M All Steel Pool and Accessories

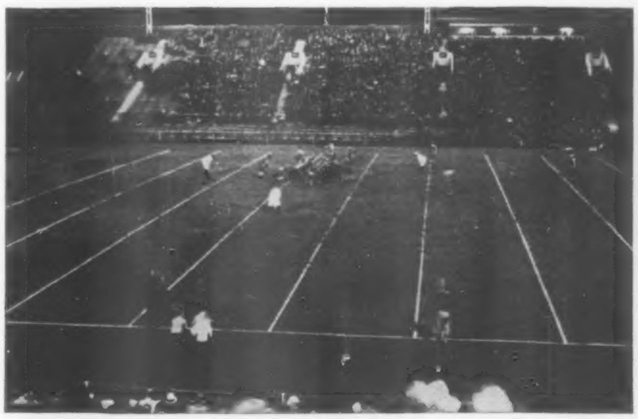
Pittsburgh-Des Moines All-Steel Swimming Pools represent the best value in durability, economy and appearance to be obtained. Lower in first cost than properly-constructed pools of other materials, the P-DM All-Steel Pool requires no maintenance other than a coat of paint at reasonable intervals. It is absolutely watertight; withstands frost action and ground movement without harm; is smooth, sanitary and good-looking for a lifetime. Subject to business conditions, P-DM designs, fabricates and erects steel swimming pools complete with all accessories—under a responsible guarantee of satisfaction. Send for our "All-Steel Swimming Pools" Bulletin No. 402—of value for your reference files.

GENERAL ELECTRIC COMPANY

General Office: Schenectady, New York

SALES OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES

YOU can rely on General Electric for the best floodlighting service that present-day circumstances will permit. In times like these, we are naturally devoting a large part of our facilities to the manufacture of military equipment and can not meet your needs completely. G-E renewal parts for the maintenance of all types of outdoor lighting equipment can be obtained, however, by the use of the proper priority application form.



Floodlighting the football field provides increased attendance, bigger gate receipts, and additional practice time for teams

Floodlighting increases play-time for such sports as tennis, badminton, and horseshoe pitching; putting practice on golf greens, skating, hockey, etc.

Artistic floodlighting of buildings and monuments is often highly desirable—particularly if the spot illuminated is of historical interest

Underwater floodlighting of swimming pools increases attractiveness and provides an additional measure of safety for the swimmers

BENJAMIN ELECTRIC MFG. CO.

General Offices: Des Plaines (Chicago Suburb), Ill.

230–234 W. 17th Street NEW YORK	20 N. Wacker Drive CHICAGO	448 Bryant Street SAN FRANCISCO

LIGHTING EQUIPMENT FOR SCHOOL AND UNIVERSITY


Football Field


Tennis Court


Softball Field

WAR PLANT LIGHTING NEEDS HAVE FIRST CALL ON BENJAMIN EQUIPMENT

Lighting being a vital production tool, war plant lighting has priority on all Benjamin equipment. Therefore Benjamin units are available to schools and universities only when such deliveries do not interfere with the Victory effort and are in accordance with priority regulations. However, there are no priorities on planning and, for this purpose, the services of our engineering department are available and yours to command without cost or obligation of any kind. Whatever your problem, be it planning, specification or maintenance — please feel free to call on Benjamin.

Sincerely yours,
BENJAMIN ELECTRIC MFG. CO.

FLOODLIGHTS


"Play-Area" Senior


"Ellipto-Lite" Play-Area

Benjamin "Play-Area" Senior Floodlights, for 750-1500 watt lamps, meet every requirement of football field lighting. They combine in one unit a large open-type porcelain enameled steel reflector with an inner auxiliary reflector of steel, with a durable baked-on finish, having a high reflection factor. Units are finished green outside, white inside. Available with any of following brackets: cross arm for 4¾-inch wood cross arm, cross arm with pipe clamp.

Benjamin "Ellipto - Lite" Play - Area Floodlights are also used extensively in football field lighting. They are of the same general construction as the "Play-Area" Senior but are smaller and less expensive. The 750-1500 watt size is recommended.

"Play-Area" Senior and "Ellipto-Lite" Floodlights also have a wide application in the lighting of baseball fields, softball fields, playgrounds, hockey rinks, swimming pools, stadia, etc.

REFLECTORS


Glassteel Diffuser

For effective glareless illumination of gymnasiums, field houses, basketball courts, indoor tracks and rinks, baseball cages, handball courts, etc., the Glassteel Diffuser is recommended. Provides finest quality of soft, well diffused illumination with a minimum of glare. Finished inside and out with white porcelain enamel and supplied in sizes for 150 to 1000 watt lamps.

For the lighting of classrooms and buildings devoted to engineering and vocational pursuits, the Glassteel Diffuser and the RLM Dome are recommended. The RLM Dome Reflector is of porcelain enameled steel and provides good uniform illumination over flat and upright surfaces. Finish is green outside, white inside.


RLM Dome Reflector

The same equipment recommended for vocational departments is also suitable for laboratories where moisture, corrosive fumes and hazardous atmospheric conditions are absent. For laboratories where explosive hazards are present, a complete line of explosion-proof and Dust Tight equipment is available; where only moisture and noncombustible fumes are prevalent, "Vapolet" units meet requirements.

For lighting book stacks in the library or shelves and bins in the store room, the "Stock-Bin-Lite" is recommended. Provides uniform illumination from top to bottom of shelves. Reflectors are of porcelain enameled steel, white inside and out.


"Stock-Bin-Lite"

There is a suitable lighting unit in the Benjamin line to meet any lighting problem in schools and universities.


Gymnasium


Library


Engineering Dept.

EVERSON FILTER SERVICE CO.

Water Purification Systems, Chlorine Sterilizing Apparatus
Swimming Pool Filters, Fittings, Lights and Equipment

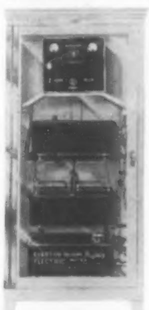
214 West Huron Street, Chicago, U. S. A.

BRANCH OFFICES

New York City, 155 E. 44th Street **St. Paul, Minn., 2233 W. University Ave.** **Los Angeles, Cal., 1950 W. Olympic Blvd.**
REPRESENTATIVES in: Detroit, Mich.; Miami, Fla.; Boston, Mass.; St. Louis, Mo.; Columbus, Ohio; Britton, Okla.; San Antonio, Texas

EVERYTHING FOR THE SWIMMING POOL

"Everything for the swimming pool" means more than that with Everson. It means not only specialized equipment for installation, operation and maintenance, but specialized service and a knowledge of swimming pool requirements based on the continuous experience of a quarter of a century in this one field. During this time, Everson engineering and leadership has actually established standards in methods and equipment which are to be found in every modern pool. Standardize on EVERSON equipment, accessories and supplies. It is your safest method of assuring trouble-free operation and compliance with all Federal, State and Municipal Health Codes.



Safety Electric SterElator

SterElatorS by Everson

Everson SterElatorS are the last word in swimming pool sterilizing equipment.

Three basic types:

(A) Chlorine Gas SterElatorS, easiest to operate, accurate, dependable and safe. Several types, all capacities.

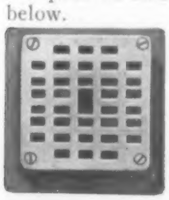
(B) Safety Electric SterElatorS manufacture "Chlorine" (sodium-Hypochlorite electrolytically as needed from ordinary rock salt and water. End need for obtaining, shipping, handling and storing chlorine.

(C) Solution Feed Chemical Pumps.

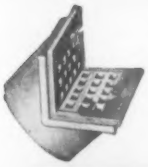
The SterElator becomes an integral part of the pool re-circulating system. (See diagram below.

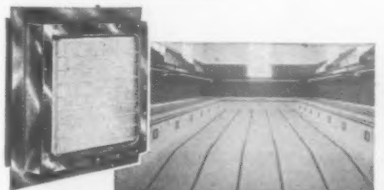
Chlorine Gas SterElator

EVERSON POOL FITTINGS



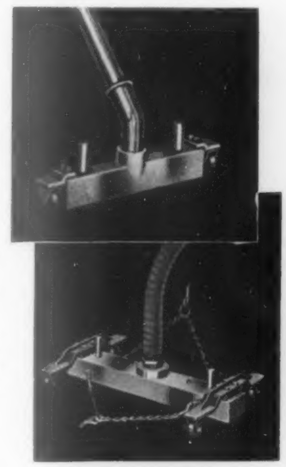
Everson Pool Fittings designed exclusively for (rather than adapted to) swimming pool re-circulating systems. Typical of this line is the Adjustable Flow Inlet Fitting that permits easy balancing of the system, simplifies piping and lowers piping costs. This patented fitting also permits the correction of faulty circulation in existing pools, the stepping up of water turnover to meet the new and more rigid health requirements, and the conversion of old draw-fill tanks into modern recirculation pools.





EVERSON UNDERWATER LIGHTS

Scientifically designed for efficient underwater illumination with special lenses, reflectors and cases.



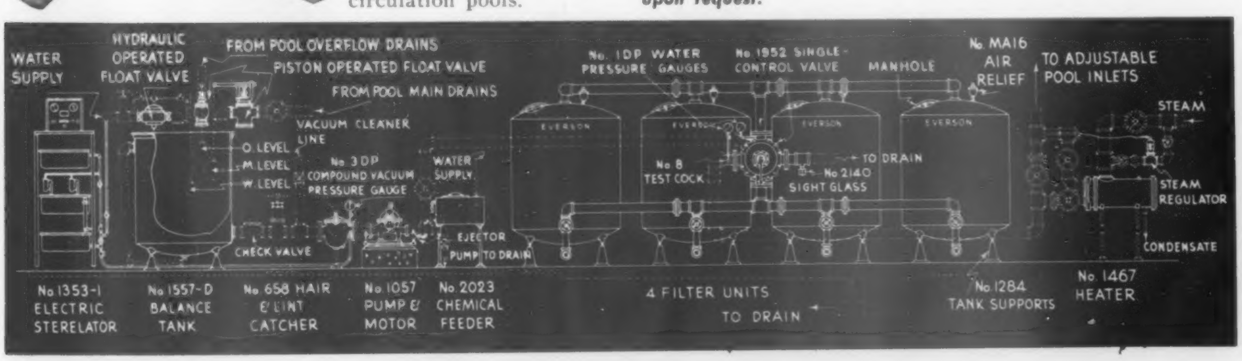
EVERSON SUCTION POOL CLEANERS

The Everson Line of Suction Pool Cleaners is complete, includes both pusher and dragline types, in all sizes with correct brushes and attachment for each type of floor and wall construction. Both "Built-in" and Portable types (portable units either gasoline or electric powered).

EVERSON POOL SUPPLIES

Everson is your logical source for all pool needs—tested Pool Chemicals, Diving Boards, and Stands, Pool Ladders and Slides, Safety Equipment, Foot Baths, etc.

Write for Special bulletins: of SterElatorS, Fittings, Underwater Lights, Pool Equipment, etc. Special technical service given architects, engineers and contractors. Typical Pool Drawings and Specifications upon request.



AMERICAN PLAYGROUND DEVICE CO.

Anderson, Indiana, U. S. A.

Foremost Manufacturers of the BEST in Approved Equipment for Playgrounds and Swimming Pools

AMERICAN EQUIPMENT *for* SCHOOLS

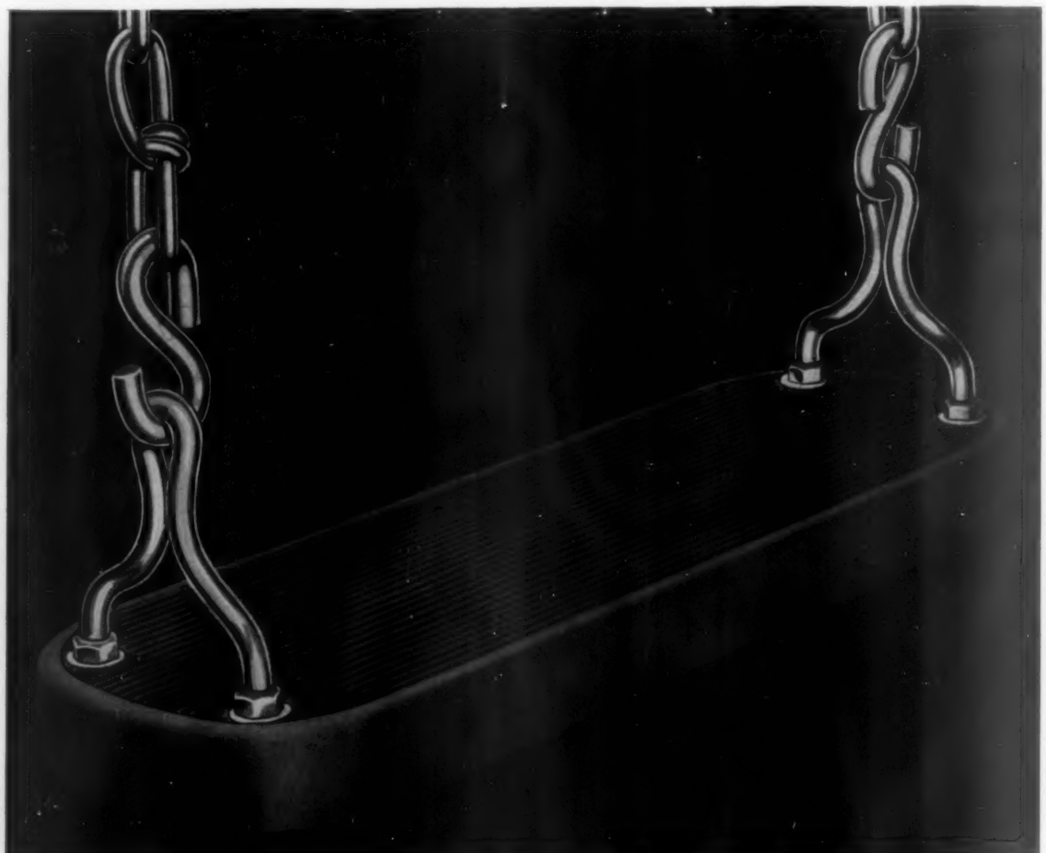
Foremost IN CONSTRUCTION PERFORMANCE *and* DESIGN

MAKE YOURS AN ALL-*AMERICAN* PLAYGROUND!

Equip **now** with AMERICAN Approved Swing Sets . ALL-METAL Slides . **Heavy-Duty** Merry-Go-Rounds . American **CASTLE TOWERS** . **Chain Link** Tennis Nets . Combination Units . Flag Poles . Horizontal Ladders . See-Saws.

The NEW AMERICAN **RUBBER** SWING SEAT Is **SAFE** STRONG and DURABLE!

Insure your Swing Sets with American SAFETY **Rubber** Swing Seats, **now.**



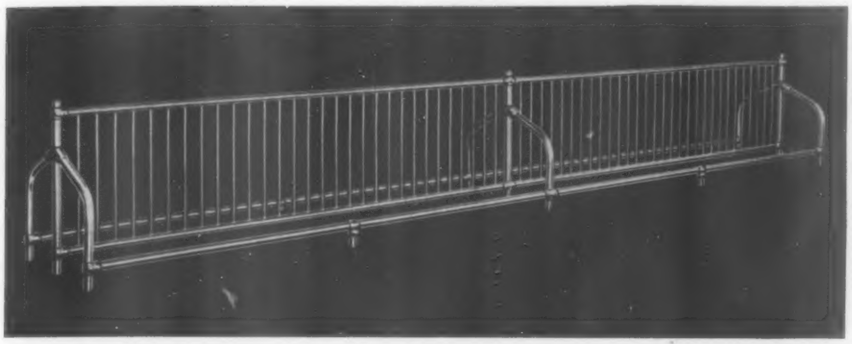
AMERICAN IS UNSURPASSED FOR STRENGTH *and* DURABILITY

Write for our Fully Illustrated, **60-Page** Playground Equipment CATALOG, **today.**

AMERICAN PLAYGROUND DEVICE CO.

Anderson, Indiana, U. S. A.

The *Finest* in Playground Equipment — Swimming Pool, Park and Beach Equipment

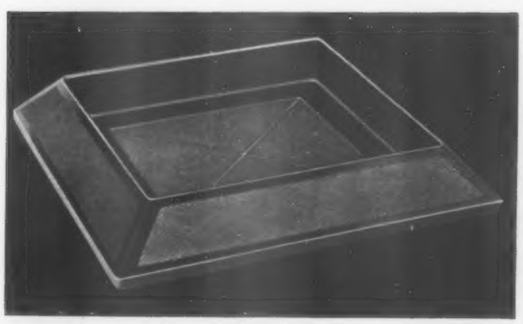


AMERICAN *APPROVED* BICYCLE RACKS

American Bicycle Racks are the PERMANENT and ECONOMICAL solution to your troublesome bicycle parking problems. **Strong** and **Ruggedly** constructed, they give years of perfect service.

The American CASTLE TOWER is the **Ideal,** SAFE Climbing Structure.

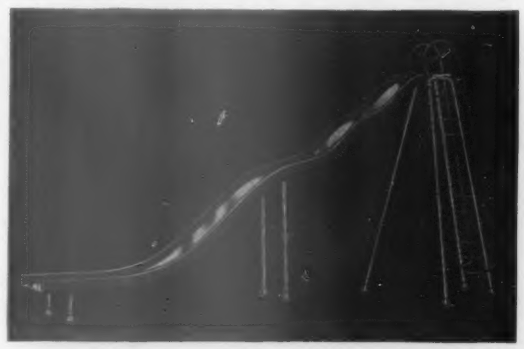
AMERICAN PLAYGROUND EQUIPMENT IS USED AND *ENDORSED* BY THE NATION'S LEADING EDUCATORS AND RECREATIONAL AUTHORITIES

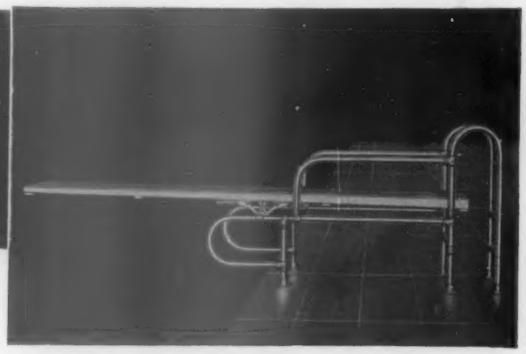


American ALL-METAL Slides are UNEQUALLED in construction, give **LIFETIME** Performance!

☆ ☆

American FOOT BATHS with Hypochlorite are **positive** protection against Athlete's Foot.





AMERICAN *SWIMMING POOL* EQUIPMENT

Official REGULATION Diving Boards . Beautifully **Streamlined** OFFICIAL Diving Stands . Pool Ladders . Water Slides . Water Sport Devices . Pool Cleaning Equipment . Pool Ladders . Accessory Pool Equipment.

Write for our complete, illustrated, **40-page** Swimming Pool Equipment CATALOG, **now.**

AMERICAN EQUIPMENT IS FOREMOST IN PERFORMANCE *and* CONSTRUCTION

PENNSYLVANIA SALT MANUFACTURING CO.

1000 Widener Building, Philadelphia

New York — Chicago — St. Louis — Pittsburgh — Wyandotte — Tacoma

For sparkling, clean tile.... *use* TILITE

HERE'S a good way to make your pool more attractive . . . to keep it sparkling clean . . . and to save labor costs. Clean your swimming pool with Tilite, used regularly by many famous pools all over the country.

Tilite is ideal for fast, labor-saving cleaning of mosaic, ceramic or vitrified tile. Its *double* chemical-mechanical cleaning action swiftly removes both imbedded and surface dirt, as well as rust and many other types of stain and discoloration.

Tilite is safe to use. And it contains no soap to make wet surfaces dangerously slippery. You can *save* by using Tilite, too, because a little does a lot of cleaning. Comes in 50, 150 and 300 lbs. drums.

We also recommend Per*chlor*on for pool sanitation, used on the walls after cleaning with Tilite, and to chlorinate the water. Containing more than 70% available chlorine, this stable and concentrated product dissolves readily and enables you to sanitize your pool at low cost. Just now, of course, Per*chlor*on, like all other chlorine compounds, is being used in such quantities for defense purposes that deliveries are being delayed. If you have to wait for your supply of Per*chlor*on, please be patient.

Tilite, however, is immediately available. Try it now at our expense! Write your name, the name of your pool and your address on a penny postcard. . . . We'll send you a generous *free* sample of Tilite.

Then use your sample on the surfaces of your pool which are normally *hardest* to clean. See for yourself how thoroughly Tilite cleans.

Perchloron
REG. U.S. PAT. OFF.

TILITE

REG. U.S. PAT. OFF.

WALLACE & TIERNAN COMPANY, INC.

Manufacturers of Chlorine and Ammonia Control Apparatus

Main Office and Factory: Newark, New Jersey

"SWIM IN DRINKING WATER"

REPRESENTED IN

Atlanta	Chicago	Detroit	Kansas City	Minneapolis	Roanoke
Boston	Cleveland	Greensboro	Knoxville	Oklahoma City	San Francisco
Bridgeport	Columbus	Houston	Lexington	Omaha	Seattle
Buffalo	Dallas	Indianapolis	Los Angeles	Philadelphia	St. Louis
Charlotte	Denver	Jacksonville	Madison	Pittsburgh	Syracuse
					Washington, D. C.

Wallace & Tiernan, Ltd., Toronto, Canada
Wallace & Tiernan, Ltd., Winnipeg, Canada
Wallace & Tiernan, Ltd., Montreal, Canada
Wallace & Tiernan, Ltd., London, England

CHLORINATION

Since the school swimming pool has become a major factor in the physical training program, the importance of efficient sterilization increases. A report of the Joint Committee of the American Public Health Association and the Conference of State Sanitary Engineers contains excellent advice to school executives. In part, this report states: "From all available information, the addition of chlorine either as a gas or water solution by use of proper apparatus is today the most satisfactory method of pool disinfection." Only chlorine gives a penetrating sterilization, protecting bathers at every point in the pool. Today more than 5000 pools in the United States rely on W&T Chlorinators.

W&T TYPE MSE CHLORINATOR

W&T Type MSE Chlorinator for the Sterilization of Average Sized Swimming Pools

Chlorine requirements for the majority of indoor pools and the smaller outdoor pools are less than 12 pounds per day. With a range of feed rates to include all changes in bathing load and recirculation rate, this chlorinator is ideal in this application. It is accurate and reliable and can be safely entrusted to non-technical help.

W&T TYPE MSV CHLORINATOR

Fills the need of larger pools and heavier bathing loads. It is an efficient sterilizer with ample capacity, simple to operate and of sturdy construction. More than 7000 chlorinators of this type have been placed in service and a survey of repair costs reveals the average annual maintenance cost is less than one per cent. In eighteen years no W&T Chlorinator of this type has ever worn out.

W&T AMMONIATOR

W&T Ammoniator Used with a W&T Chlorinator to Produce Chloramine

By combining chlorine and ammonia for water treatment chloramine is formed and a more lasting sterilizing action obtains. Though somewhat slower, this effective treatment insures persistent sterilizing action to overcome sudden increases in bathing loads. W&T Ammoniators conform to the same high standards of precision workmanship and materials found in W&T Chlorinators. They are designed to provide the added advantages of chlorine-ammonia treatment when used in conjunction with W&T Chlorinators.

W&T CHLORINE COMPARATOR

Accurate control of chlorination in pools requires a periodic series of checks by means of the ortho-tolidin test. The W&T Hellige Chlorine Comparator, using ortho-tolidin, provides a sturdy, accurate, simple means of testing. Only a moment's time is required to determine residual chlorine and no special technical knowledge is necessary.

AT YOUR SERVICE

W&T maintains a nationwide sales and service organization of skilled experts in water purification. They are prepared to offer recommendations on any problem of swimming pool sterilization.

Current literature, available on request, gives information on swimming pool sanitation and W&T equipment.

EN-TOUT-CAS AMERICA, INC.

TELEPHONE
Circle 6-5547

630 Fifth Avenue, New York, N. Y.

EN-TOUT-CAS FAST-DRYING TENNIS COURT CONSTRUCTIONS

3 DISTINCT COLORS

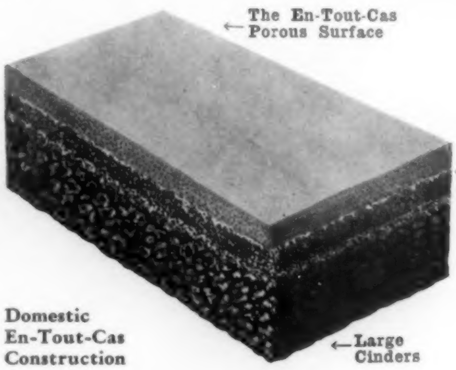
Exclusive builders in the United States of America of two fast-drying tennis court constructions — made entirely of American materials—in three distinct colors. These constructions and colors are also used for badminton courts, deck tennis courts and other play areas.

Red and Green in "Domestic Champion"—We claim the "Domestic Champion" Court to be the most inexpensive fast-drying court to maintain in existence today; competitively priced.

Grey-Green in "Domestic Challenger"—A popular American value in a fast-drying court; moderate initial cost; low upkeep; in dull grey-green only.

EN-TOUT-CAS PLAYING SURFACE

En-Tout-Cas was developed over 35 years ago to give a playing surface comparable to grass courts without some of the shortcomings. A granular material was perfected that combined several desired qualities—porosity, to give rapid draining; firmness, to maintain a true surface; resiliency, to reduce players' fatigue; color, to eliminate eyestrain and glare; plasticity, for easy application and maintenance. Throughout the world, thousands of fine courts have since been built of En-Tout-Cas material. Modern, domestic En-Tout-Cas is the refinement of this famous court.



Domestic En-Tout-Cas Construction

THE FAMOUS FAST-DRYING EN-TOUT-CAS CONSTRUCTION

Graded porosity is the outstanding construction feature of En-Tout-Cas fast-drying courts. This is obtained by the uniting of the special surface material with a scientifically constructed foundation. The surface is porous but non-absorbent. It does not retain water and cannot become water-logged as does ordinary clay or turf. The water quickly passes through the surface and into the more porous foundation to seep away. Total thickness is 5 in. maximum. With average care, En-Tout-Cas construction is permanent. Courts laid in 1915 are still in active use.

ADVANTAGES OF FAST-DRYING EN-TOUT-CAS

Perfect Playing Surface—The springy but firm surface of En-Tout-Cas courts, with its true ball action, has made them the choice the world over.

Available 30 Minutes After Rain—As En-Tout-Cas courts are truly fast-drying, a shower does not spoil all tennis for the day. Within a half hour after the usual rain the court can be in play without any harm to the surface, the balls or racquets.

Longer Playing Day and Season—The graded porosity that gives faster drying also enables an En-Tout-Cas court to recover quicker from frost in Spring and Fall. A longer playing season, of more usable days, is made possible.

Easy on Eyes—The soft red and greens are pleasing colors that eliminate the glare of white courts and contrast well with the ball, thus doing away with eyestrain. They blend well with the landscape.

Resilient—In its springiness, En-Tout-Cas compares with a close-clipped grass surface. The bound of the ball is true, uniform and at the proper height.

Clean and Dustless—En-Tout-Cas is dustless and clean. The colors are permanent and will not stain clothing, balls or tapes. Tape is always visible. En-Tout-Cas is ideal for indoor courts.

ANNUAL RECONDITIONING AND PERIODIC MAINTENANCE

Reconditioning in Spring—The cost of the annual Spring reconditioning of an En-Tout-Cas court is less than that of any good clay or dirt court. Under normal conditions, little new material is needed and application of this is simple.

Attention During Season—En-Tout-Cas courts normally require less upkeep in labor, time and material than other non-fixed type fast-drying courts. Even when the court is played on steadily day after day, it requires only simple dragging and sprinkling before play—a matter of 20 minutes. Rolling, the costliest of all operations, averages once every 7 days. Detailed instructions for care and maintenance are furnished for every court.

A standard size court is 60 x 120 ft. in size, located approximately north and south. The actual playing area, within the lines, is 36 x 78 ft. in size.

OTHER EN-TOUT-CAS PRODUCTS

Clay and Asphalt Constructions—En-Tout-Cas also builds tennis courts and play areas in either clay or asphalt.

"Suburban" Surface—A fast-drying surface for clay courts; at the price of a good serviceable clay court—with less maintenance; in red or green.

"Colourcourt" Surface Dressing—A special dressing to improve the surface of clay courts and asphalt courts.

Equipment and Accessories—Domestic nets, net posts, center guides, marking tapes, specially built rollers, court brushes, sprinklers and sprinkling systems, fences, playground equipment, outdoor furniture, etc., are supplied for all makes and types of recreational areas.

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 Rector Street, New York, N. Y.

BRANCH SALES OFFICES:

BOSTON • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DETROIT
NEW ORLEANS • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SYRACUSE

PLAY AREAS CAN BE KEPT DUSTLESS and WEED-FREE AT LOW COST!

. . . and by a treatment that is clean, odorless, colorless and non-staining. It safeguards health . . . clothing . . . school rooms and adjoining property. Ends dust annoyance to spectators of games.

The Solvay Calcium Chloride treatment is adaptable to practically any type of unpaved surface. It is used to end dust and deter the growth of grass or light weeds on clay, gravel, cinders, earth, shell, bluestone. It can be applied by anyone on large or small areas—no experience or special equipment is necessary. Its cost averages only 3¢ to 4¢ per square yard per season.

Solvay Calcium Chloride treatment has been adopted as standard practice by many of the Nation's leading universities, colleges, preparatory, public schools and camps. It has long been used and recommended by federal, state and local park and highway departments.

WRITE FOR FREE FOLDER TODAY! No charge or obligation. Write to SOLVAY SALES CORPORATION, 40 Rector Street, New York, N. Y., or use the postage paid American School and University post-card in the back of this book.

USED FOR OVER 25 YEARS ON:

Tennis Courts
Baseball Diamonds
Running Tracks
Jumping Pits
Indoor Cages
Playgrounds
Parking Areas
Camping Areas
Walks and Drives

For Cleaner, Weedless Dust-free Play Areas, Use

SOLVAY CALCIUM CHLORIDE

SECTION VII
CLASSROOM—LIBRARY—AUDITORIUM

AN INTEGRATED REDESIGN OF SCHOOL FURNITURE

By FREDERICK E. MARKUS Engineer and **PAUL F. NOCKA** Designer

Markus & Nocka, Architects, Boston, Mass.

IN an attempt to find the answer to the many criticisms of conventional school furniture by educators, a period of intensive research was undertaken. With the critical data available, new furniture was designed not only from scratch but entirely from the abstract, and the resultant models checked in classroom use. Here are some of the things which had been bothering educators:

Lack of height adjustment in high-school seating
Poor posture of seated pupils
Wrist strain when holding books at correct angle
Rattle of movable furniture on uneven floors
Breakage due to sitting on writing surfaces
Difficulty of cleaning under units

Of fourteen specific improvements made, the following two alone would appear to justify the time and work involved:

Posture is natural and correct at all tasks.
Seat and desk adjust automatically to pupil heights.

Problem

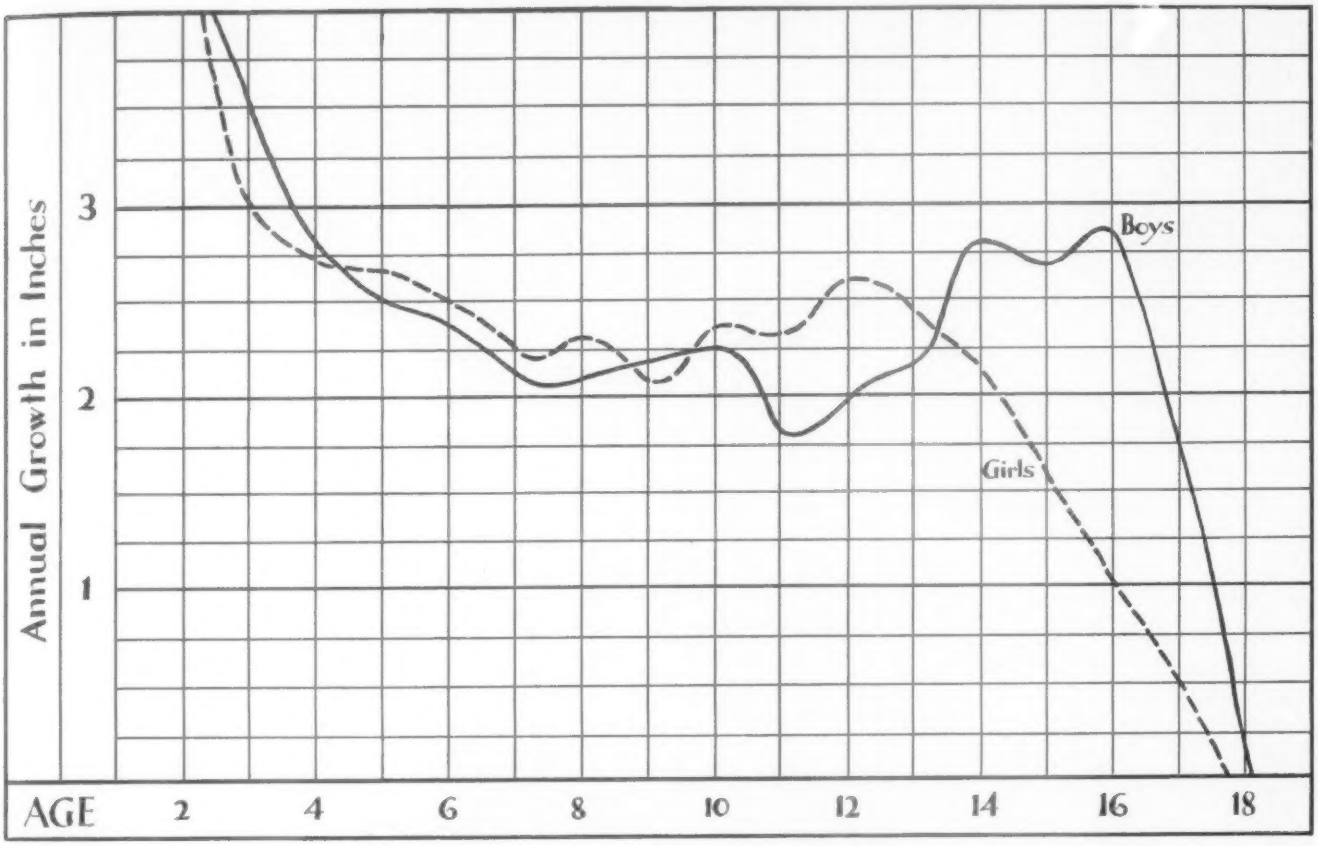
There seem to be two schools of thought on the subject of school seating. One is that mental accomplishment increases in direct proportion to physical obstacles surmounted—a rather puritanical philosophy—while the newer and more general thought is based upon the idea that complete physical comfort makes for the best mental productiveness. For a school seat, the former would provide a flat board and probably a teacher-police system of compulsion, while the latter would make the seat and desk so completely comfortable that the student's mind would have no physical distractions. Obviously, the second plan is in harmony with the modern trend in business and industry as well as in education, and the one under whose influence the authors have labored. If it is wrong, so also are the precepts of modern instruction.

In connection with a recent school-building project, available seating units were carefully investigated only to find that in manufacturers' catalogs the pictures of pupils sitting in an erect, military fashion did not agree with actual classroom postures. In classrooms equipped with the same furniture, inspection revealed student posture varying from approximate reclining to hunching at all angles.

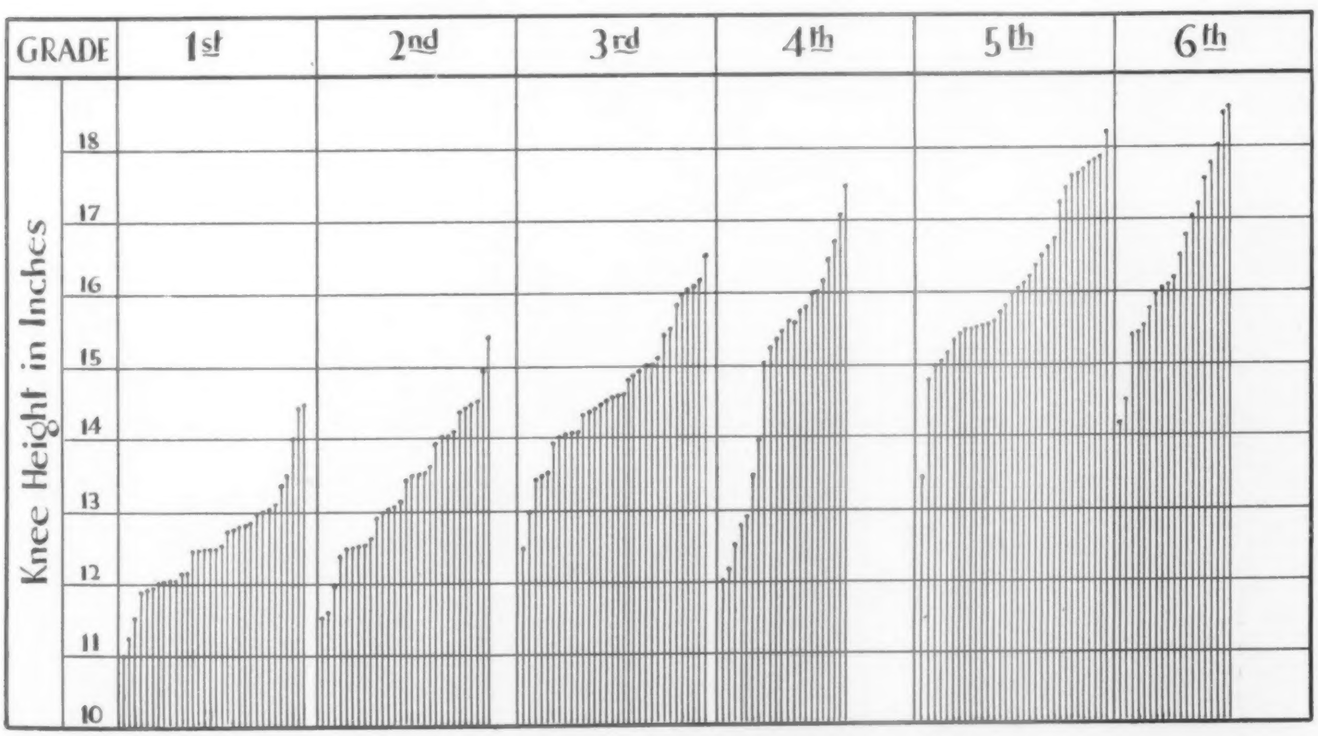
The obvious question was, "Why should posture in practice be so bad?" We determined to find the answer. Since that time, more than two years have passed, and roughly 3,000 man-hours have been spent in seating research. To establish working data, several thousand students from primary grades to adults were measured and the results recorded as follows:

Standing height in shoes
Floor to posterior knee when seated
Floor to top of knee when seated
Seat to elbow
Seat to eye level
Age
Weight
Class
Sex

By questioning teachers, principals, school executives, and custodians, a long list of criticisms of conventional furniture was compiled in addition to the main and obvious fault—poor posture. Where adjustable chairs and desks are provided, owing to the human element, rarely were adjustments correctly made. Then, too, in departmental work where students move from class to class, adjustments if correct for one group would not fit another. Tall students tend to slouch down when reading to avoid a jackknife pressure on the two seat bones; short pupils also slouch



Annual growth of boys and girls. To get these data, several thousand students from primary grades to adults were measured. Growth varies with nationality, climate, and social status. The results shown represent a fair average for American children



Knee measurements of children in one of the elementary schools tabulated. Note that the short pupils of the third grade are taller than the short pupils of the fourth grade, and that the sixth grade has several pupils shorter than some of the first grade pupils

down to get their feet on the floor; all students hunch forward when writing. Books held for correct visual-reading angle strain wrists and arms. Along with the advantages of movable furniture, discipline is more difficult, owing to the wabbling of desk units on uneven floors. Considerable breakage results from students sitting on desk tops. Most chair-desks make cleaning difficult because of numerous legs and low stretchers and braces. Quite a formidable list!

These criticisms suggested a review of the fundamental elements of seating and related activities with an open mind, dissecting the units into individual parts—seat, back, writing surface, supporting frame, etc. Since correct posture was the starting point, the seat was analyzed first.

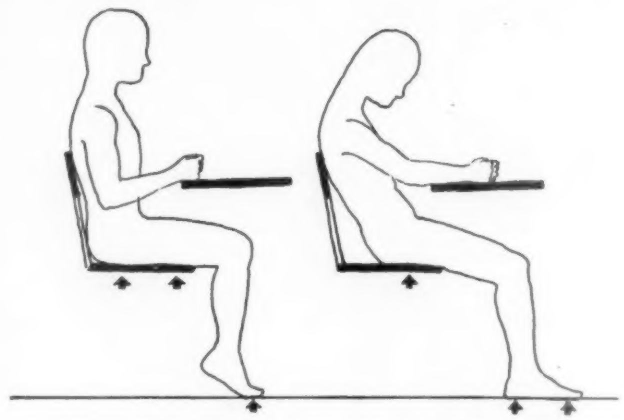
Seat

Students were asked to sit on a perfectly flat seat and insert flexible shims at all possible locations until maximum comfort was achieved—the preferred cross-section of each subject being recorded both front to back and laterally. Refinements were made and checked with modeling clay. To give a better understanding of this problem, the seat was taken to the Harvard Medical School, and skeletons were seated thereon. Here it was immediately evident why so many seats are not comfortable. The two tuberosities of the ischium (seat bones) present two vertical cutting blades when one sits erectly. This no doubt is the reason that aborigines and orientals developed different methods of sitting. An interesting note in this experiment was that the preferences for seat contours made by students—tall, short, heavy, or light—varied only slightly.

In determining the height of the seat, it was felt absolutely necessary for one size to accommodate comfortably, without manual adjustment, all sizes of students in junior and senior high school. This was done by allowing the angle of the seat to change. To accommodate the talls and shorts, the seat was in effect given a pivot at the approximate center of gravity of a seated pupil. Checking of angles and location of pivot point was made by using an adjustable model. The solution of this phase of the problem actually gave us several additional advantages. First, we accommodate junior and senior high-school students comfortably by one size. In addition, the seat automatically adjusts itself regardless of movement of feet, height of heels, or rate of growth. An average elbow height is established also, due to the fact that the torso of a seated short person tends to be raised while that of a tall person is lowered. Finally, in any shift in position of the legs, the seat automatically heals itself to the buttock.

Back

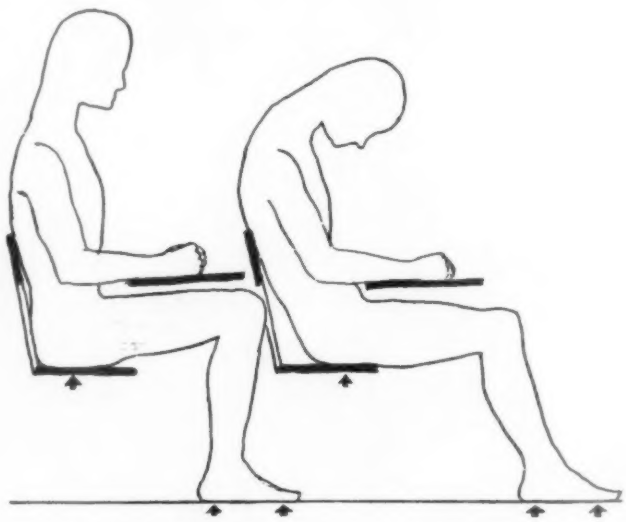
The slope of the back approximates that of a theater chair, with relaxation as the most important factor. Such a slope reduces the strain on neck



Theoretical posture Actual posture

Short Pupils in Conventional Seating

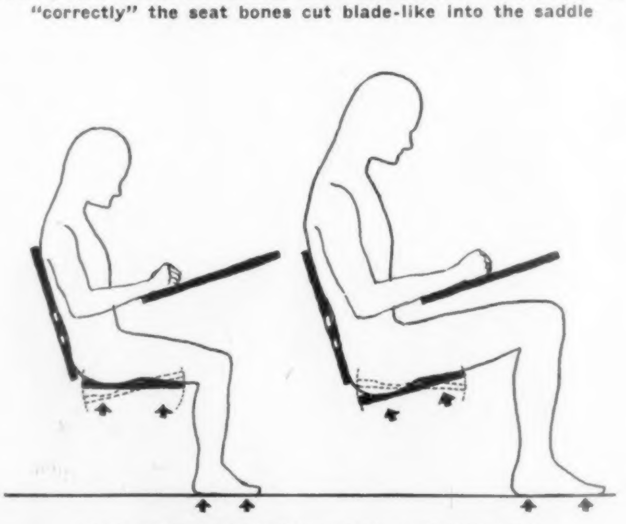
Short pupils slouch forward to place their feet flat on the ground. When sitting erect, as is assumed in theory, their feet may be as much as 2 inches above the floor



Theoretical posture Actual posture

Tall Pupils in Conventional Seating

Tall pupils slouch forward to avoid discomfort. When they sit "correctly" the seat bones cut blade-like into the saddle



Automatically Adjusting Spring Pivoted Seat

With the weight evenly distributed over pivoted seat and floor, pupils enjoy complete comfort in all seat activities. Note that the short pupil is raised and the tall pupil lowered toward the same writing plane

muscles as well as the temptation to hunch forward. The exact angle was determined by fatigue tests.

The back height was established by noting where the tallest subjects ceased to make contact. For the correct lateral curve, subjects were asked to lean against thin fins of modeling clay applied to a wood back. These impressions were recorded and a horizontal curve established which gave support where the buttock is well padded, at the same time preventing contact with the spine on the lower crossbar. Numerous tests indicated that it is unwise to curve the back vertically, but a slight projection for the small of the back appeared to add appreciable comfort for a wide range of sizes.

Tablet Arm

Before designing a tablet arm or any other writing area, it was considered necessary to determine the ideal writing slope for the seat and back adopted. This was difficult because students were so accustomed to hunching forward when writing that it seemed unnatural to them to write in an erect posture.

It is interesting to note that in old monasteries where monks illuminated manuscripts continuously, they used very steep writing slopes. Just recently a large manufacturing company installed working tables for their engineers which also have a very steep slope. The slope which was finally selected is at right angles to the back. It has been found very comfortable by all subjects.

The natural writing arc of short- and long-armed persons and the natural location of the paper were the two determining factors for the shape of the tablet arm. Consideration was also given for clearance in getting in and out and in passing between a tablet arm and a chair. The shape and location of the tablet arm make writing quite comfortable for left-handed students, most of whom prefer not to recognize their peculiar requirement by having special furniture assigned to them.

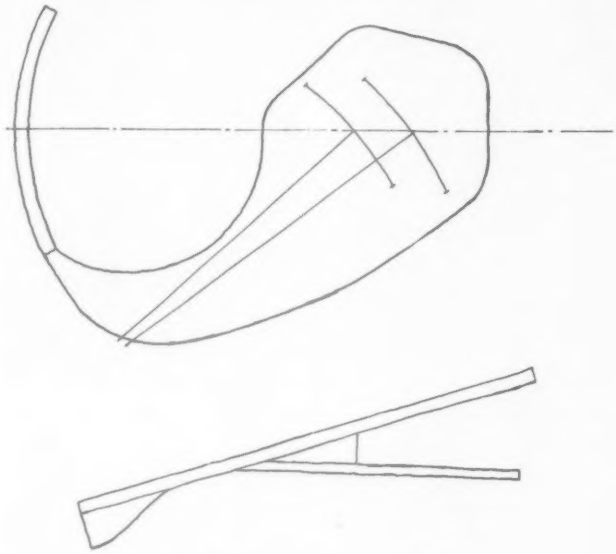
Storage for several reference books was provided under the tablet arm.

Chair-Desk

The slope used for the tablet arm is also used for the chair-desk because the major activity in both cases appears to be writing.

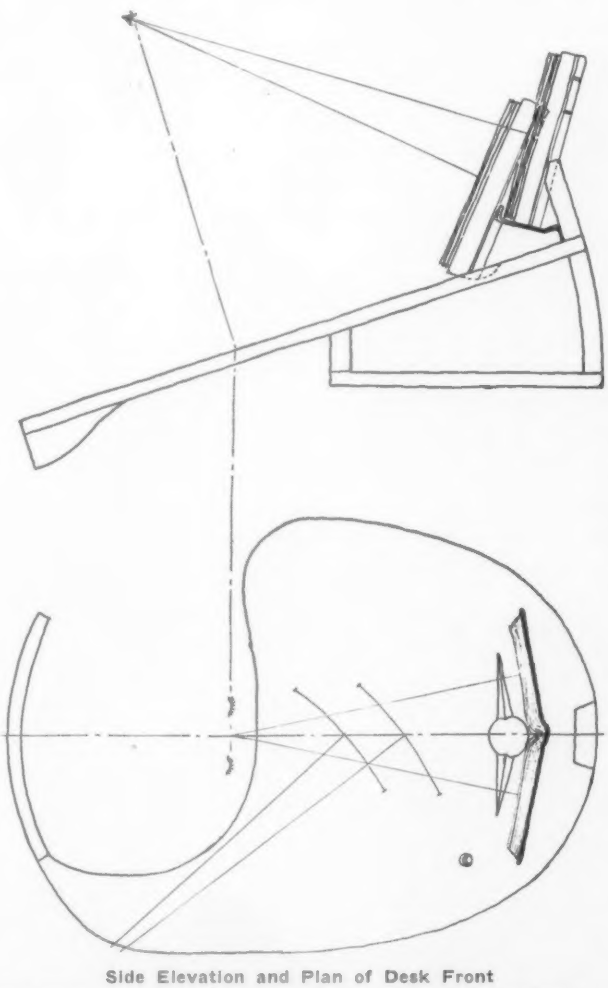
The shape of the top is the result of recorded space requirements of all activities regularly performed on a classroom desk.

Despite the fact that the steeper angle of the desk gives less visual distortion when viewing books laid flat, it seemed desirable to provide a two-position support for holding books. One position is for reading in which the pages are free for turning, and the other higher position is for reference in which the pages are held open. The latter position gives no interference with the paper in any normal writing area for right-



Plan and Side Elevation of Tablet Arm

The natural writing arcs of short and tall pupils were all found to bisect the center line of the seat. The shape frames the natural writing arcs and provides right-arm and paper support. The lower shelf is for book storage. Comfort and elimination of visual distortion dictated a steeper writing slope than usual



Side Elevation and Plan of Desk Front

The desk model is similar in working angles to the tablet arm. Its added features are a rack with a two-position support for holding books, a larger writing area, and support for the left arm, which is desirable for long writing periods

or left-handed students. In both positions, each page is at right angles to the average line of vision. Owing to the equalizing action of the seat, the eye point becomes fairly constant.

Typing

Research brought to light many surprises. After producing a posture apparently ideal for reading and writing, attention was turned to typing. In the course of discussions while gathering data, persons presumably well informed on the subject gave assurance that the posture that had been established for reading and writing was not practicable for typing. However, as in any form of research, nothing can be taken for granted.

A typing unit was built in which the seat and table were adjustable for height, and the seat and back adjustable for slope. Subjects were seated at a typewriter, and the height and angle adjustments were made to suit their liking. Nine measurements were recorded for each subject and from their mean a model was built for extended trials.

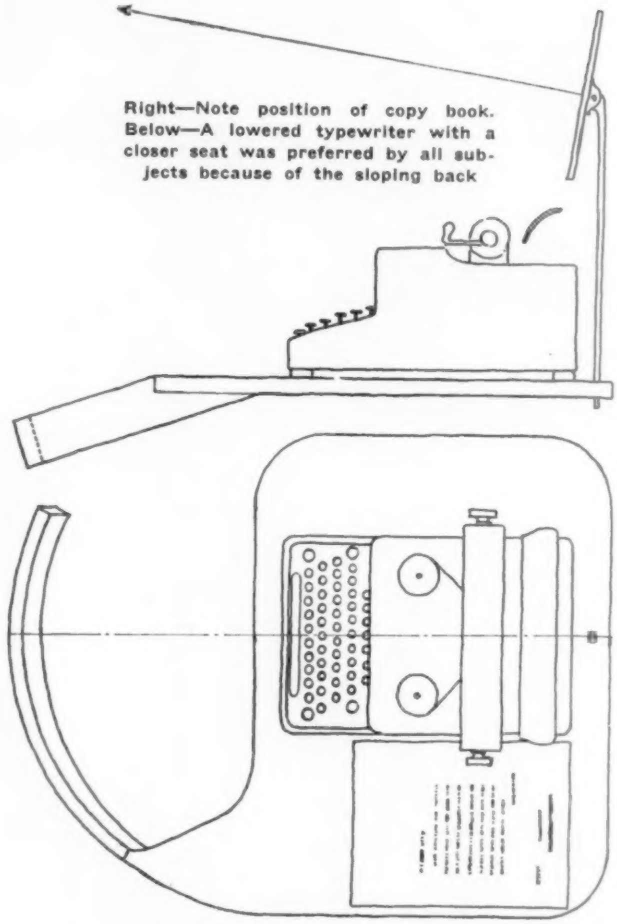
A study of photographs of students typing showed that most of them had no contact with their chair backs. All bent their necks excessively to see their notes or textbook. Either there was considerable distortion due to improper angles, or the distance strained their eyes, and in many cases both evils were present. With subjects already habitually adjusted to these many shortcomings, it was often difficult to determine what really constituted a correct set of conditions.

As a final check, a number of duration tests were made. Subjects typed continuously during a 90-minute period at the same time of day on successive days, alternating between their regular typing desk and chair and the fixed model. Ninety minutes of continuous typing at a conventional typing table, without rising, was found to be very fatiguing, especially for the back. The same period of typing seated in the integrated model produced no noticeable fatigue in any of the subjects.

Drawing and Fine Arts

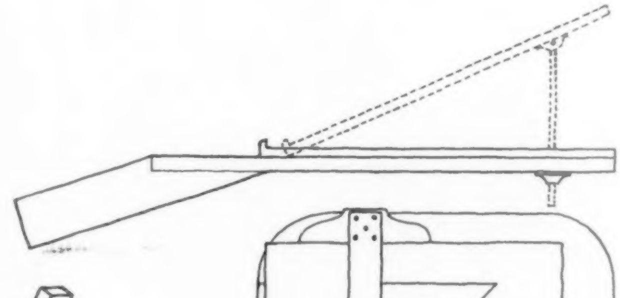
One of the most difficult problems, especially in the design of the smaller high school, is the infrequent use of certain rooms because of their specialized equipment. A large high school can provide special rooms and desks for geometry, mechanical drawing, free-hand drawing, and painting. A small school, on the other hand, of necessity must provide all these functions in a single room and preferably on furniture designed to accommodate not only these special activities but often regular classroom work in addition. A unit to function in this capacity was therefore designed as part of this series.

The working top of this unit is adjustable to any angle from 0 to 90 degrees off the horizontal. The



Right—Note position of copy book. Below—A lowered typewriter with a closer seat was preferred by all subjects because of the sloping back

Side Elevation and Plan of Typing Table



Side Elevation and Plan of Adjustable Top Drawing Table

The top is adjustable in angle and distance from the eyes and makes an ideal working surface for geometry, mechanical and freehand drawing, as well as for regular classroom activities

distance from working plane to the eye is optional within limits. A drawing board can be used if desired, and a level space to the right provides a place for instruments and other material.

Supporting Frame

In designing a supporting framework for the various units, the practice of the automobile manufacturers was followed; namely, to have the fewest number of parts, and as many parts interchangeable between types as possible. Also, a three-point support being the ideal, it was used where practical, and a fourth added only on the typing and drawing units to give the required stability. Owing to the flexibility incorporated as part of the framework design, the unit with four feet will adjust itself to any slight unevenness in floors.

The floor space occupied by the tablet arm and chair-desk is about equal to that of conventional types. The typing and drawing units occupy somewhat less space than is customarily required.

Study-Hall Chairs and Tables

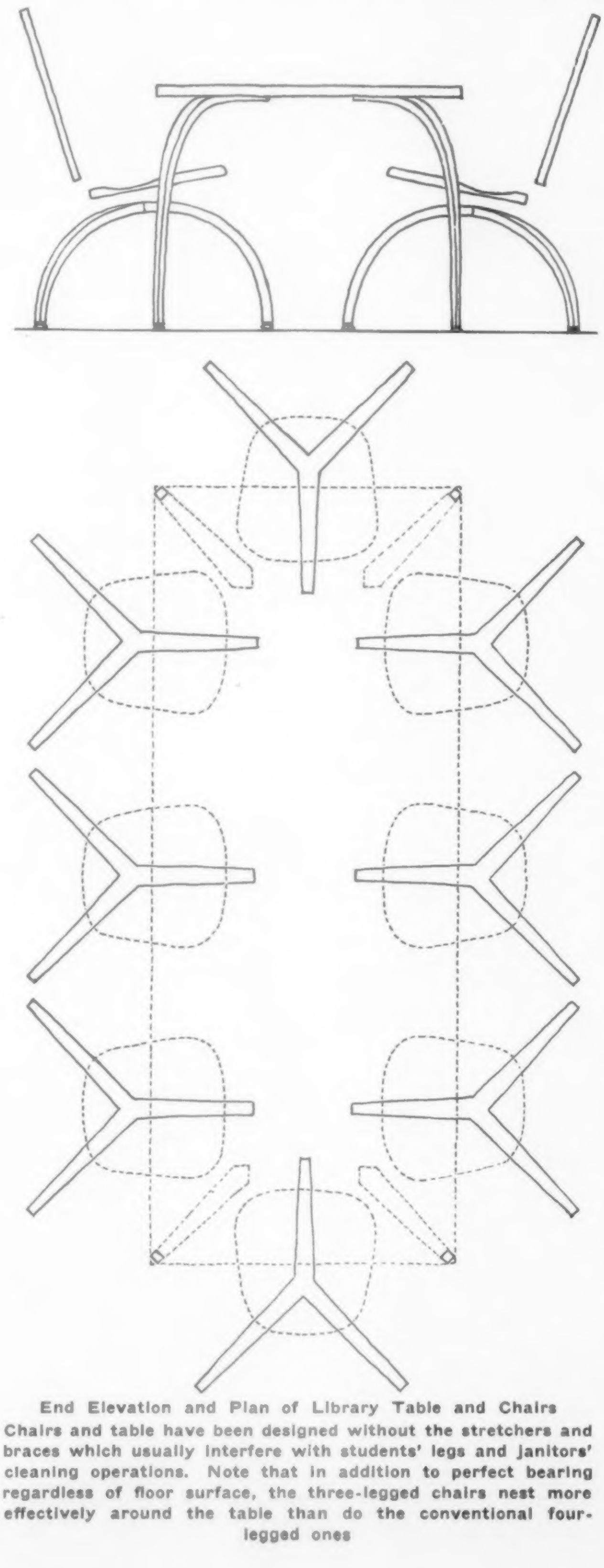
By removing the tablet arm, a chair was produced which was more comfortable than any general-purpose chair that could be found for making comparisons. The first question asked was—would such a chair have any merits for study-hall use? To us, and to everyone to whom the question was broached, the answer appeared to be decidedly negative. Nevertheless, as said before, nothing was to be taken for granted. A standard study-hall chair and table were set up, and alongside, the chair model with a table adjustable for height. Twenty-nine or 30 inches has apparently no scientific basis for acceptance as a standard table height. It was obvious that tables are normally much too high. The test brought out two surprises: first, the alternate usage test did show better posture and less fatigue in the integrated chair; second, the table height chosen for writing varied from 24½ to 26¼ inches. A tabulation gave the average of preferred heights as 25½ inches, which was used in our table design.

Summary

In conclusion, we believe that what success our research and design may have had was due to two main points:

1. By integrated methods of designing in the abstract, more faults in conventional furniture were corrected than we even knew existed
2. Not being authorities on school seating, we did not know enough to keep away from generally accepted impossibilities.

However, it must be admitted that while producing this series of furniture, ground was lost on one item. It is more difficult to get in and out of the various units than the conventional types, owing to the combination of lower seat, sloping back, and the location of writing surface. Every attempt to correct this one disadvantage has compromised many decided improvements which were obviously more important.



End Elevation and Plan of Library Table and Chairs

Chairs and table have been designed without the stretchers and braces which usually interfere with students' legs and janitors' cleaning operations. Note that in addition to perfect bearing regardless of floor surface, the three-legged chairs nest more effectively around the table than do the conventional four-legged ones

DESIGNING SECONDARY-SCHOOL CLASSROOMS

By **N. L. ENGELHARDT**
Professor of Education
Teachers College, Columbia University

and

JOSEPH M. LEPS
Graduate Student in Educational Administration
Teachers College, Columbia University

Over a period of years, secondary-school classrooms have been planned in a more or less stereotyped manner. The chief criteria used in planning have been an adequate number of square feet of floor space, usually 18 to 20 square feet, a standard height of 12 feet, a ratio between window area and floor area of 20 per cent, and consideration of heating and ventilation. Such considerations, to be sure, are essential, but they might be grouped in a mechanistic category. In large degree, they have a remote rather than an immediate relationship to classroom service. They affect the comfort and safety of individuals, but they contribute in only a limited sense to the desired educational outcomes of classroom instruction. There may be those who would wish to argue this point, and the authors agree that these past desiderata play a significant role and that the effect of their influence is a matter of personal judgment.

Functional Planning

Functional planning of school spaces has, it is true, received some emphasis in the past. Perhaps the kindergarten exemplifies best this type of planning.* Special rooms, such as art rooms, music rooms, and laboratories, have also been developed more or less on a functional plan. The work of the general classroom has not been given much thought in this planning. Perhaps the pattern of one's youth, namely, teacher-textbook-recitation, has been permitted to influence architects, and even schoolmen, too much in determining the nature of the classroom.

The development of any individual, whether youth or adult, is augmented in a functional environment. The modern psychologist considers each individual as a unique entity possessing mental, physical, emotional, and social attributes and reacting as a whole to the entire situation comprising any experience. The classrooms should achieve a homelike, comfortable atmosphere and should eschew any suggestions of institutionalism or stereotyped formality. They should be planned for use rather than display. The pupils should feel an incentive to arrange, decorate, and adjust these classrooms to fit their immediate program and personalities.

It is most difficult to plan a classroom in terms of abstract needs. One might say that the classroom should provide all possible facilities for the development of personal freedom, tolerance, justice, social efficiency, democratic living, and leadership. What can this mean to the architect? Does it imply variation from traditional spaces, the helpful use of color schemes, and the planning of equipment that will lead toward these ends? Is there a remote suggestion here that a classroom with blackboards lined up on three walls might be restrictive to freedom and even to democratic living? Here is involved a struggle in thinking through which the architect in planning must pass if more wholesome secondary classrooms are to result. The school strives to encourage loyalty to home, community, school, country, and mankind. Can any feature of classroom planning contribute to this end? There is the occasional display of the flag and now and then a picture of an American hero but, in most cases, the classroom seems to be remote from the community and the general social setting.

It should be borne in mind that in a sense every classroom must be a laboratory. The physical sciences have succeeded fairly well in getting their laboratories equipped to meet instructional need. The laboratories of English, social studies, mathematics, languages, and other subject-matter areas have been unfortunately neglected in this respect. Each classroom should be equipped with reference material, supplies, tools, and adequate storage provisions in order that it may serve as a self-contained learning area. Today's planner is obligated to discover how English is being taught and what physical needs must be met; the nature of social science instruction and the kinds of instructional materials and project results which must be stored or displayed; and the tendency toward making mathematics a living subject rather than merely an abstraction and thus necessitating workrooms properly equipped for project development. It would be most helpful if the architect could enroll for some months in high-school classes before he planned the replacement of a high-school building.

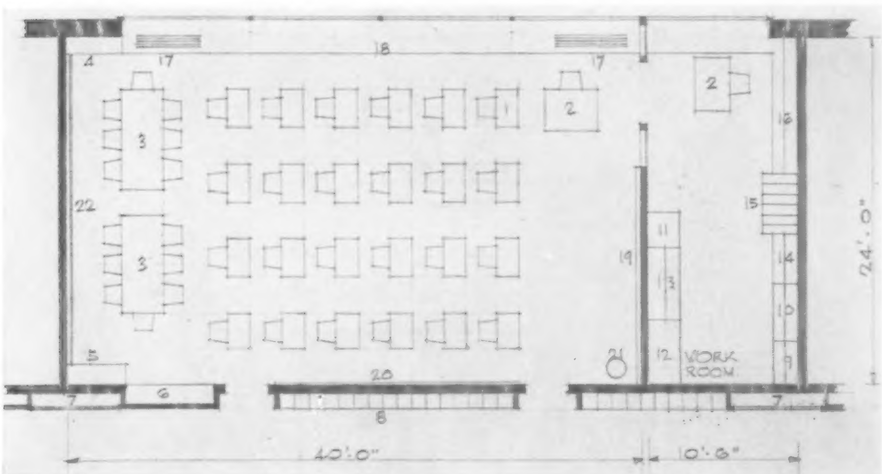
Flexibility for Maximum Use

The classroom units for use in the academic department should possess flexibility to admit their maximum use during each school day throughout the year,

* For planning elementary classrooms throughout the nation, see "Elementary School Classrooms, Portfolio A," by N. L. Engelhardt and School Planning Associates. Bureau of Publications, Teachers College, Columbia University, 1941.

and for part-time, extension, and adult programs. The planning should take into account the necessity for adaptation to the developing teaching techniques and curriculum growth which should accompany changing economic and social conditions. It should conform to the need for making the "community school" a center for the further education, recreation, and development of the youth out of school and the adult population. The classrooms should be arranged in respect to other departments and services of the school in order to provide for the most desirable integration of the total school program.

In the three criteria outlined just above, the architect may find conflict, but he should bear in mind that the high-school planning of the first four decades of this century is already obsolete. A new type of secondary-school structure must be evolved. New needs of youth and of adult are constantly arising.



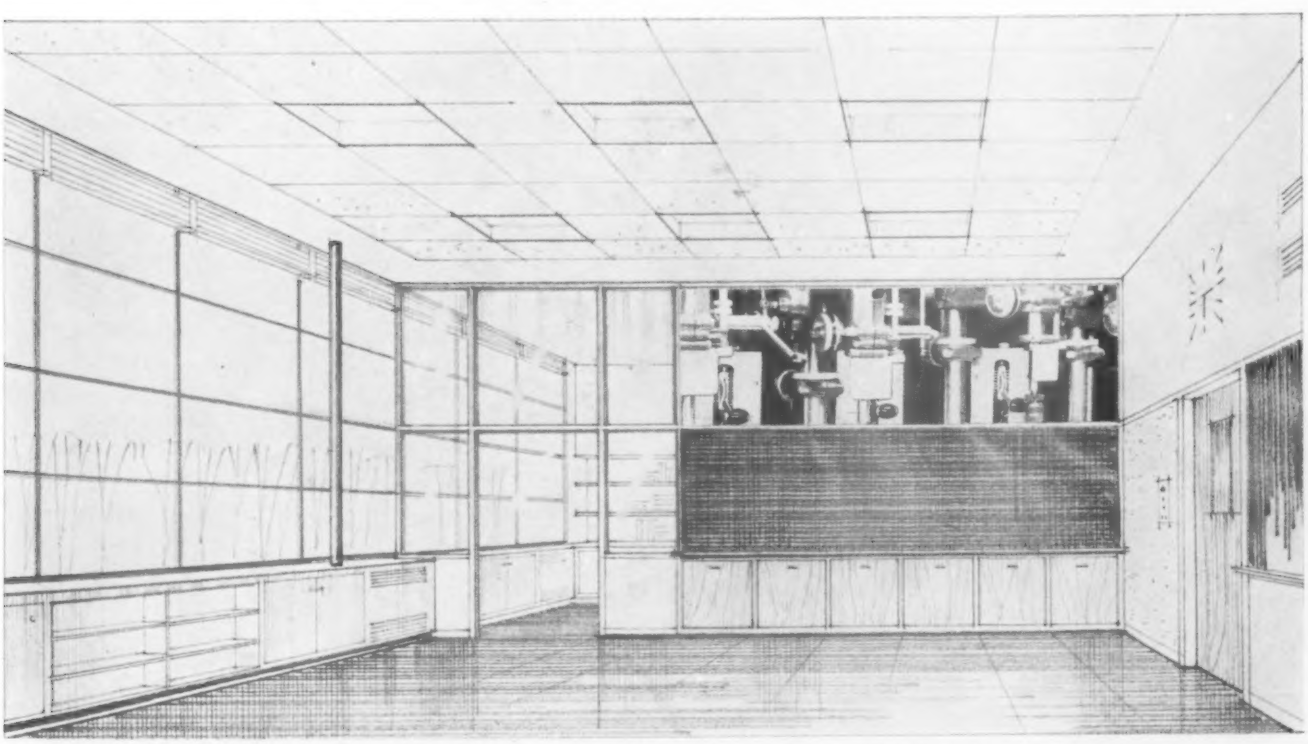
LEGEND

1 Student's Desk
2 Teacher's Desk
3 Conference Table
4 Newspaper Rack
5 Bookcase
6 Museum Case
7 Display Case
8 Lockers
9 Tool Case
10 Model Case
11 Teacher's Locker
12 Chart File
13 Cabinets
14 Instrument Case
15 Vertical File
16 Bookcase
17 Heating Unit
18 Storage
19 Blackboard, Cases Under
20 Blackboard
21 Spherical Blackboard
22 Display Board

Drawings prepared by School Planning Associates, Elizabeth, N. J.

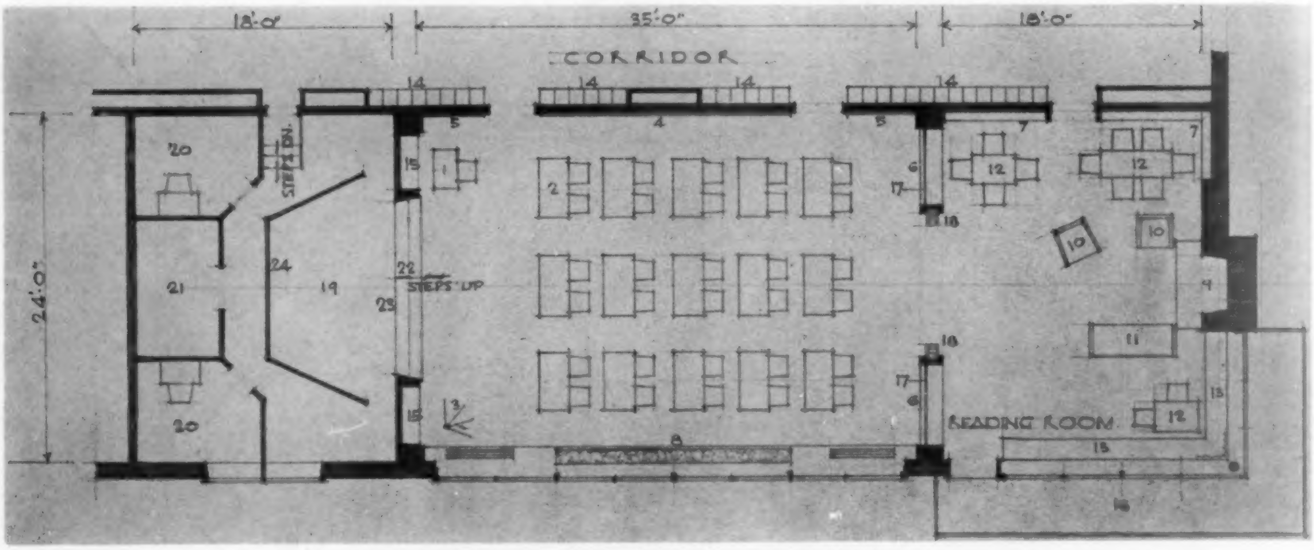
MATHEMATICS LABORATORY (Floor Plan)

This laboratory consists of two parts, a workroom and a recitation room. In this workroom can be developed the models of all kinds related to the mathematics instruction



MATHEMATICS LABORATORY—LOOKING TOWARD THE WORKROOM (Elevation)

These rooms are well lighted and provided with much storage and book space. The decorations and color scheme of this room can give new spirit to mathematics

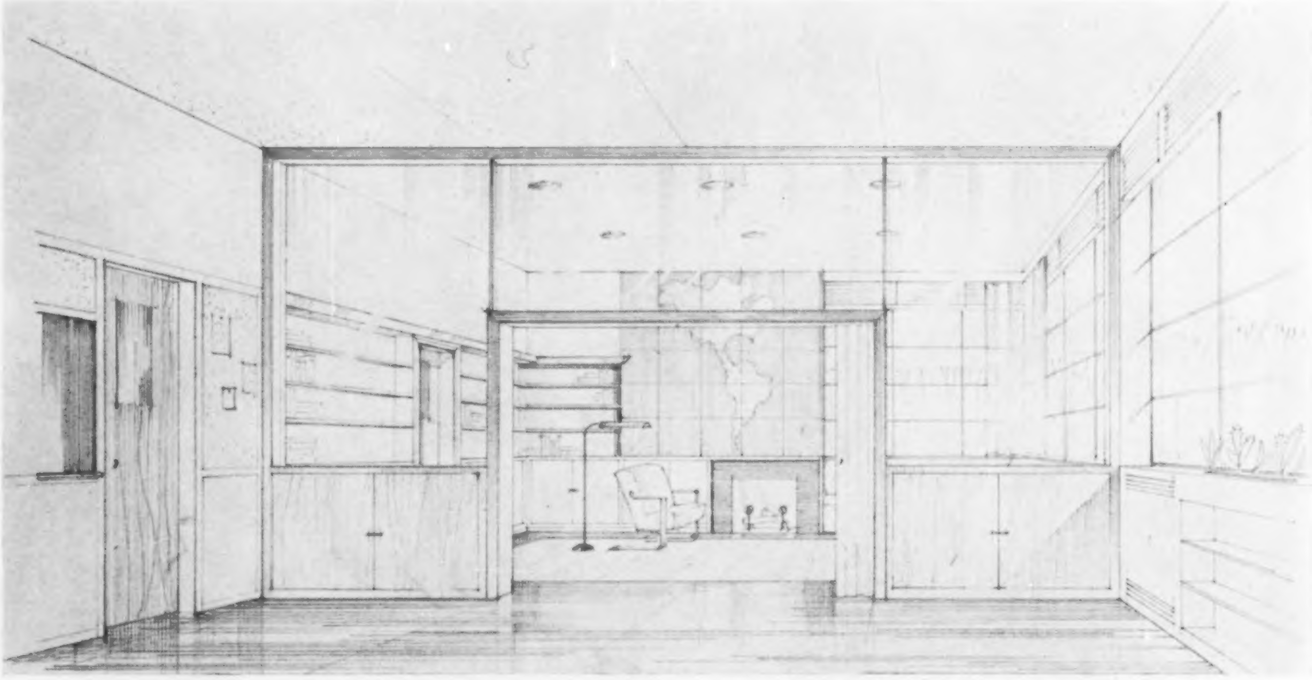


ENGLISH LABORATORY (Floor Plan)

Space is provided for the activities which should be associated with the teaching of English, such as a stage for dramatics and small conference rooms. There is an adequate storeroom. Library and reading room are directly associated with the classroom. Coziness and friendliness have been sought in the preparation of the reading room

LEGEND

1 Teacher's Desk
2 Student Tables
3 Sectional Movable Blackboard
4 Blackboard
5 Tackboard
6 Cabinet
7 Bookshelves, Cabinets Below
8 Open Shelves, Flower Box Above
9 Fireplace
10 Armchair
11 Lounge
12 Reading and Conference Table
13 Window Seat
14 Lockers
15 Open Shelves, Statuary Niche Above
16 Terrace
17 Glass Screen
18 Folding Door
19 Stage
20 Dressing, Conference, Reading or Listening Room
21 Storeroom
22 Overhead Speakers for Radio and Talking Pictures
23 Motion Picture Screen
24 Cyclorama



ENGLISH LABORATORY—WITH VIEW TOWARD READING ROOM (Elevation)

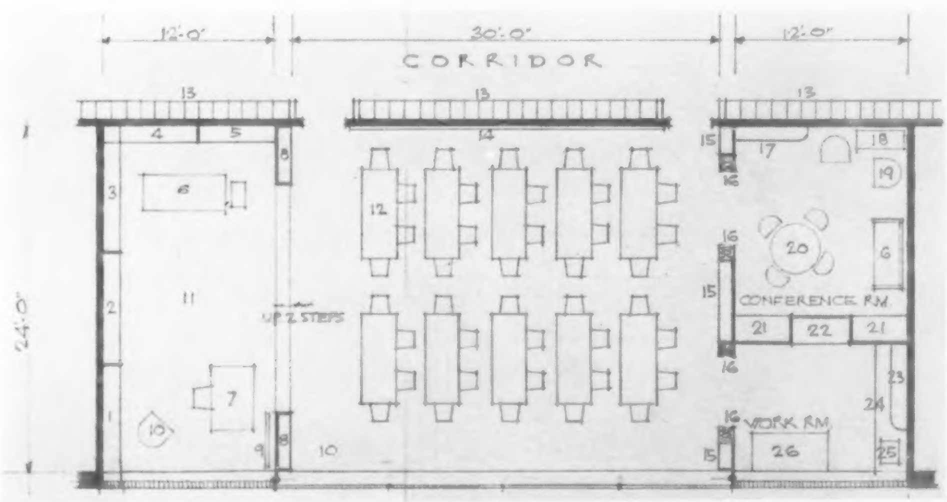
In this English suite many types of social as well as teaching activities can be carried on. The space, as planned, lends itself to group activity. The large glass partitions make for attractiveness. The reading room can be cut off from the teaching space if desired. Book shelves are open and large storage cabinets are provided

Coordination between school and community planning is essential. It may be that, in the future, permanence of construction may, for many types of school planning, give way to less durable but more adaptable materials.

Accompanying this article are illustrations of classrooms conceived in terms of this discussion. The architectural design and drawings of these classrooms were prepared by School Planning Associates, Architects, of Elizabeth, New Jersey.

Checklist

No classroom can have all, or perhaps even a majority, of the features listed in the following check-

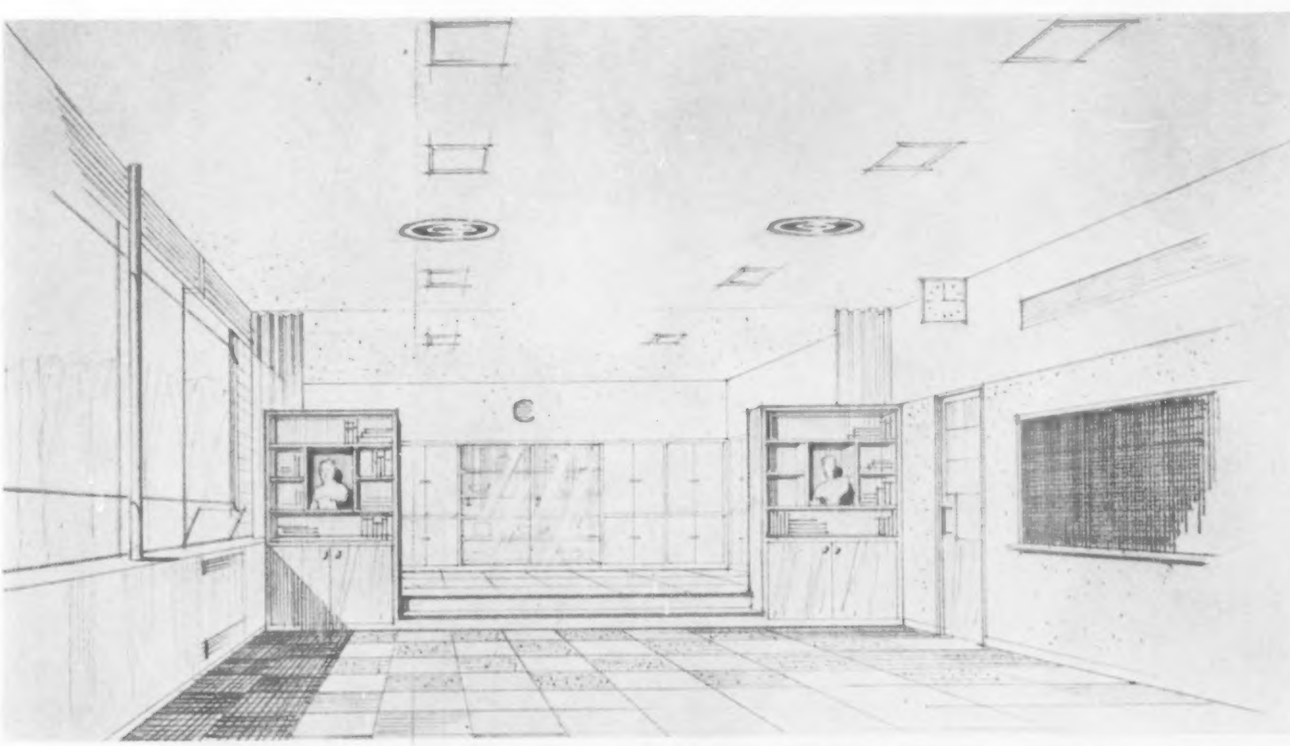


LEGEND

1 Storage
2 Local History Museum Case
3 Bookcase
4 Magazine Rack
5 Newspaper Rack
6 Exhibit Table
7 Teacher's Desk
8 Display Cases
9 Movable Blackboard
10 Multiple Display Board
11 Raised Platform
12 Student Tables
13 Lockers
14 Blackboard and Display Board Map Rack Over
15 Storage
16 Folding Door
17 Bookcase
18 Table
19 Easy Chair
20 Conference Table
21 Map and Chart Storage
22 Tool Storage
23 Open Shelves
24 Work Bench
25 Work Basin and Sink
26 Work Table

SOCIAL SCIENCE LABORATORY (Floor Plan)

Conference, dramatization, project-making, as well as recitation and discussion form the basis for good social science instruction. The four units of this laboratory would stimulate any teacher to unusual work. Students themselves would become enthusiastic over the thoughtful, carefully detailed provisions that have been made for their participation in the work



SOCIAL SCIENCE LABORATORY—WITH VIEW TOWARD FRONT (Elevation)

The stage with a two-step elevation, here at the front of the classroom may be cut off by curtains from the classroom proper and used as a conference room. Book and chart cases are used to define the proscenium arch. Open spaces like these eliminate restrictions on teaching and class opportunities

list. There must be a happy selection from this list to meet the special needs of a particular subject or a specialized area of instruction. Above all, planning should produce a livable setting which will have the power of attracting individuals and putting them at ease. Mankind has learned to build homes that are more attractive than they were twenty and thirty years ago. Man's offices are less fearsome and more homelike and comfortable, and improvements beyond those accomplished in the school have penetrated into shop and commercial center. This checklist by no means represents a finality in planning. These items may best suggest to architects and superintendents points of departure. The aim of all planning of secondary classrooms should be to make them a central and favored part of the pupils' environment, which they occupy with joy and from which they depart with reluctance.

CHECKLIST FOR SECONDARY SCHOOL CLASSROOMS

Part I. Human Values—The Design, Construction, Decoration, and Equipment of the Classroom Should Conform to the Highest Standards in the Recognition of Human Values.

A. *Recognition of the aesthetic in the general design*

1. Harmony in proportion and shape of room
2. Color combination—pleasing and varied
3. Decorative hangings
4. Design and finish of furniture
5. Design and finish of built-in features
6. Equipment whose design is in harmony with room
7. Floor treatment—hardwood, inlaid linoleum, mastic tile
8. Lighting—maximum of natural light
9. Lighting—fixtures for artificial attractive as well as functional
10. Pictures
11. Removable panels for murals
12. Suitable materials for interior finish
13. Rugs
14. Vases for flowers
15. Venetian blinds, curtains, or transluscent shades
16. Window boxes for flowers

B. *Application of the findings of psychology*

1. Art objects and materials
2. Awareness of reaction of the individual as an organic whole
3. Control of concomitant and attendant learnings
4. Design for happy, democratic living
5. Environment planned as element of learning situation
6. Interest centers
7. Models and display—pupils' work display cabinet, and bulletin boards
8. Opportunity for individual expression
9. Opportunity for creative activity
10. Opportunity for group action
11. Opportunity for relation of experience
12. Opportunity for work and thinking

C. *Contribution to community and national spirit*

1. Appropriate books and publications
2. Community maps and surveys
3. Display cabinet and bulletin boards
4. Display of flag
5. File of local historical data
6. Multiple display board racks
7. Pictures and murals
8. Rooms finished in conformity to idealized local style
9. Rooms furnished to represent regional or historical period style
10. Statuary

D. *Contribution to comfort and happiness*

1. Scientific design of chairs and furniture
2. Air conditioning
3. Acoustical treatment
4. Abundance of light and sun
5. Adjustment of furniture to size of occupant
6. Easy chairs and reading lamps
7. Fireplace
8. Kitchenette
9. Flowers
10. Plenty of space for movement
11. Music instruments
12. Phonograph and radio
13. Reading tables—proper angle of surface
14. Social room or classrooms' adaptability to social affairs

E. *Regard for physically handicapped*

1. Audiphones
2. Adjustable desks and furniture
3. Special lighting for eye defectives
4. Restrooms for individual use, conveniently distributed

F. *Recognition of pupils' individual and personal rights*

1. Cafeteria service
2. Drinking fountains
3. Individual storage space for lockers
4. Place to work comfortably
5. Provision for freedom of movement
6. Opportunity for "boy to meet girl"
7. Recognition of social impulse
8. Social room—alcoves

G. *Convenience and conservation of energy*

1. Built-in filing space
2. Built-in shelving
3. Drinking fountains at sink or in corridor
4. Fully equipped workroom adjacent to classroom
5. Lockers in passageway
6. Location and integration with rest of facilities
7. Museum space and pupil show-cases in room or corridor
8. One or two stories only

H. *Rooms constructed on basis of living*

1. Aquarium
2. Adequate storage space of all types
3. Bulletin boards
4. Chalkboards of harmonious color and size planned for program
5. Chalkboard display rail
6. Doors—attractive appearance—out of way in operation—automatic locking and control
7. Easy chairs
8. Hardwood floor
9. Linoleum on mastic tile
10. Provision for related hobbies
11. Provision for appeal to individual interests
12. Rugs and drapery—curtains
13. Radio
14. Reading lamps
15. Scientific lighting—reflection and diffusion
16. Walls and ceilings harmoniously decorated
17. Window and wall seats with cabinets beneath
18. Window boxes for flowers
19. Vases and pottery
20. Venetian blinds

Part II. FUNCTION—THE CLASSROOMS AND FACILITIES FOR THE ACADEMIC DEPARTMENT SHOULD BE PLANNED TO CONFORM TO THE MOST ENLIGHTENED IDEAS OF THE INTENDED USE. THAT IS, THE DESIGN, CONSTRUCTION, DECORATION, AND EQUIPMENT SHOULD FURTHER THE SCHOOL PROGRAM FOR THE COMMUNITY.

A. *Use of modern techniques and equipment*

1. Audio-visual aids (built in or designed *ab initio*)
   a. Camera—motion picture
   b. Files for illustrations, photographs and portraits
   c. Globes (electric)
   d. Maps
   e. Models
   f. Museum exhibits
   g. Pictographs
   h. Pictorial charts
   i. Phonograph
   j. Projector for sound motion pictures
   k. Projector for slides and film strips
   l. Opaque projector
   m. Radio
   n. Radio—two-way communication system
   o. Screen—rolled into wall or ceiling electrically
   p. Sound recording machine
   q. Stereopticon
   r. Stereoscope
   s. Television
   t. Microphone
   u. Language instruction records
2. Air conditioning
3. Barometer
4. Calculators—all types for mathematics room
5. Chalkboard—colored—white—slate
6. Chalkrail
7. Clock and signal for period change
8. Dictating equipment
9. Duplicator
10. Electric outlets
11. Glass building blocks
12. Hygrometer
13. Outlets for vacuum cleaner
14. Pencil sharpener
15. Photo-electric control for lighting, exits, etc.
16. Sliding wall panels—doors—electrically operated
17. Sound controlling treatment of ceiling, walls, floors
18. Telephone
19. Thermostat
20. Typewriters
21. Ultra-violet ray glass
22. Refrigerator
23. Recessed museum, display cabinets, and other features with individual lighting equipment
24. Stage—professionally equipped—shop, storage, dressing rooms, curtain and scenery, and lighting
25. Lighting—indirect, concealed source, fluorescent
26. Spotlighting for maps, pictures, etc.

B. *Abundant storage space*

1. Closets
2. Bookcases—built in
3. Cabinets—built in
4. Files—built in
5. Lockers
6. Cabinets for flat material beneath chalkboard
7. Shelving and bins in workroom
8. First-aid cabinet over sink
9. Recesses under movable panels for maps, pictures, chalkboards, screens, and bulletin boards
10. Window and wall seats with storage space beneath them
11. Scientific scheme for utilization of space

C. *Provision for flexibility*

1. Chalkboards, screen, bulletin boards which are reversible, slide into wall, or swing out of way
2. Curtains for darkening room
3. Movable furniture
4. Sections of pupil storage space which can be locked or unlocked in blocks for various groups
5. Movable walls and partitions to vary size of room

D. *Adequate instructional material*

1. Atlas
2. Audio-visual equipment
3. Bulletin boards
4. Chalkboard
5. Display cabinet
6. Drawing board and drafting tools
7. Dictionary and stand
8. Encyclopedia
9. Exhibits
10. Easels
11. Globe
12. Hot plate
13. Language instruction records
14. Magazine rack
15. Models
16. Newspaper rack
17. Pictures
18. Maps and charts
19. Duplicating equipment
20. Illuminated drawing board
21. Printing press
22. Phonograph
23. Recording machine
24. Room library and reference books
25. Reading table
26. Stage—make-up and dressing room
27. Stage—out-of-doors
28. Slide rule
29. Sink and running water
30. Teacher's desk
31. Teacher's chair
32. Teacher's cabinet
33. Teacher's locker
34. Teacher's filing cases
35. Transit and tools for mathematics
36. Typewriter
37. Workbench and tools
38. Workroom

E. *Recognition of social aspect*

1. Alcoves
2. Comfortable chairs
3. Conference and workroom
4. Chess and game boards in mathematics room
5. Curtains
6. Dancing in social room or adapted classroom
7. Davenport or settee
8. Musical instruments
9. Opportunity for privacy
10. Opportunity for youth-adult contacts
11. Piano
12. Provision for refreshments to be served
13. Provision for clubs and organizations
14. Reading lamps
15. Tables for games and refreshments
16. Social room or adaptation of classroom for social affairs
17. Space for freedom of movement
18. Socialized recitation facilities
19. Radio
20. Window seats
21. Fireplace

Part III. MECHANISTIC ASPECTS—THE MECHANISTIC ASPECTS OF THE CLASSROOM SHOULD CONFORM TO THE HIGHEST STANDARDS OF—

A. *Acoustics*
B. *Automatic control*
C. *Aesthetic appeal*
D. *Adaptability to group*
E. *Comfort and convenience*
F. *Flexibility*
G. *Functional efficiency*
H. *Heating*
I. *Humidity control*
J. *Interior finish*
K. *Lighting*
L. *Orientation*
M. *Safety*
N. *Sanitation*
O. *Ventilation*

THE LAYOUT AND EQUIPMENT OF A SECONDARY-SCHOOL LIBRARY

By MRS. MARGARET M. ROSS

Supervisor of Libraries and Visual Education, Board of Public Education, Wilmington, Del.

ALTHOUGH a great deal of progress has been made in the last decade in the developing of school libraries, there are still too many instances of evidence that not enough qualified supervision has been given either to designing or to equipping the library when a new school was being planned.

As soon as a school is to be built and it has been decided to include a library, someone who knows just how a library should be planned for beauty and efficiency should be appointed to work with the architect. If a librarian is available within the school system, she should be the one; if not, one should be asked to assist from some other source, for the experience of a librarian is important. Constant teamwork is needed between librarian and architect, for plans will have to be gone over again and again as each suggests some improvement or alteration. Both architect and librarian are keenly desirous of beauty in proportion and appearance; the architect is the expert on structural requirements, in fitting the library plan to the plan of the whole school; the librarian should be the one to determine efficiency from an administrative point of view. Too much emphasis cannot be placed on this point; unless a library is planned with all factors considered both in working within it and working with allied rooms, the librarian will be constantly hampered in producing the best service for the school.

The Location

Opinions differ on where to place the school library. In secondary schools it should be easily accessible to classrooms and study halls, and therefore a favorite place is the second floor, central. In some schools a wing is set aside for special rooms and the library is there. A quiet location is most desirable, avoiding proximity to a busy street or to shops. Noises within the schools can be reduced or eliminated by acoustical treatment of rooms. No longer is the auditorium across the hall to be dreaded if this precaution is taken.

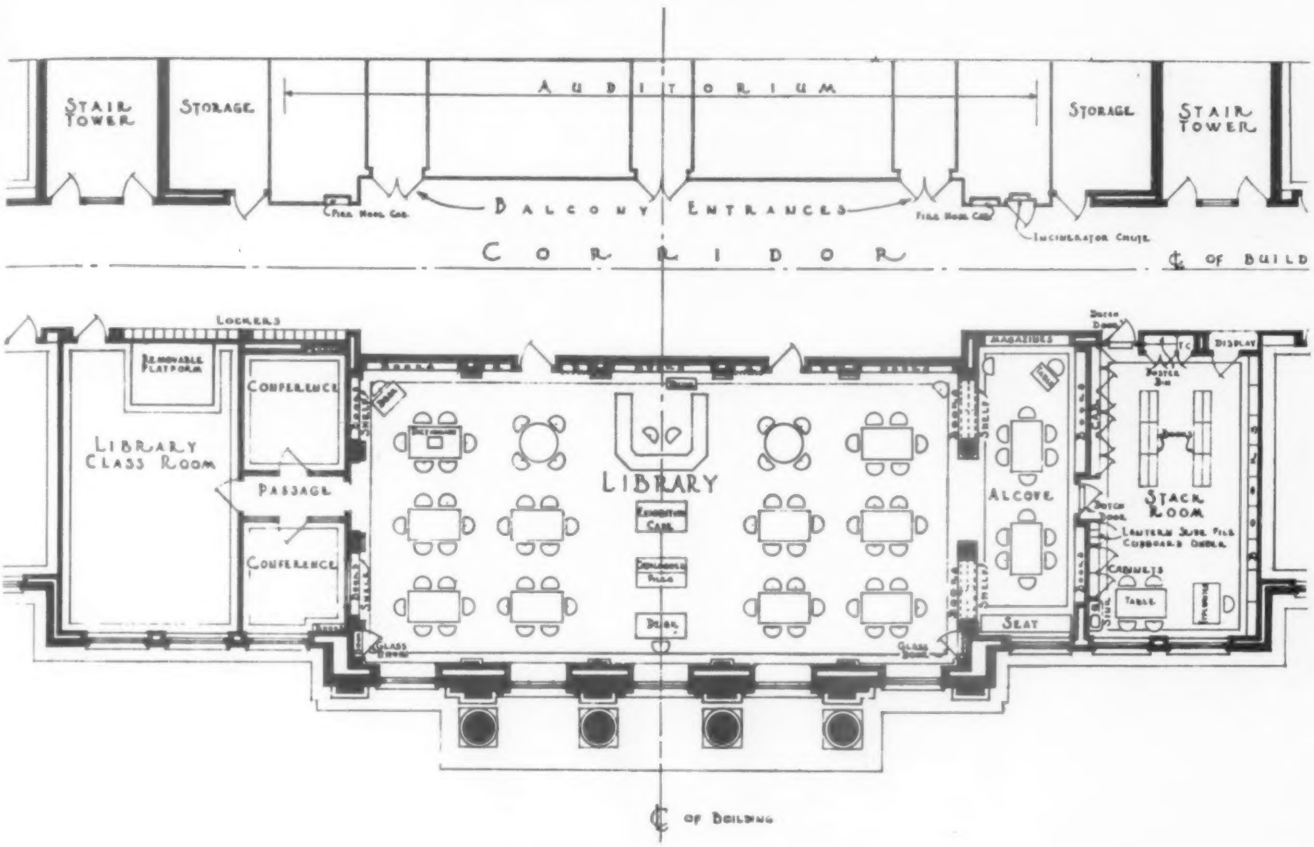
Where there are study halls, it is important that the library be near them so that no time will be lost by pupils going from one to the other. If large storage closets can be situated near the library, so much the better. One never knows at the opening of a school what problems of book housing will arise, especially if the library has charge of classroom collections (not textbooks).

The Size

Experience has proved that in the smallest school the library should seat, at a minimum, one class group. To this should be added enough space to accommodate extra pupils who may be sent there during a class period for special assignments. In the larger schools seating capacity varies from five to ten per cent of the enrolment. It may be well to keep in mind in planning the size of a room that the size of the staff must be appropriate. No one librarian can administer a room that seats, perhaps, a hundred pupils. The very size of the floor space, if it is to be covered all day, means unjustifiable fatigue for the librarian. Size, then, should be dependent on both usage and administrative facilities. It should be planned to be a library, not a study hall.

In estimating floor space, the usual and practical figure is 25 square feet per person. This will allow room for shelving and equipment. To this add for every library a workroom sufficiently large to have wall space for shelving books, for ample storage closets, a coat closet and a sink, and, perhaps, drawers for housing glass slides. One closet should have a poster bin in the lower part. In addition, this workroom should be large enough to hold a 3 x 5 table with drawers and linoleum top, two or three chairs, and a typewriter desk; linoleum, cork tile, or asphalt tile should be on the floor. There should be a door between the workroom and the library, and another should lead from the workroom to the hall. If possible, have a display window opening from the workroom to the hall. It is invaluable in providing materials for exhibition that will attract readers.

Because of economy in planning the rooms of a school, the library is most frequently required to be a rectangle. However, it must be much wider than a classroom, otherwise it will be hard to furnish and unattractive. A competent architect can arrange these proportions with some flexibility. If a square room, or one with a bay window and a window-seat can be designed, this will add to its appearance and perhaps lend to some informal treatment in furnishing. With the workroom opening from one end of the main library, in the larger schools a classroom and con-



E. William Martin, Architect

Library of P. S. duPont High School

Above—The plan of the library shows its relation to the auditorium. Storage closets across the hall are used to house classroom collections (not textbooks). Alcove to the right contains built-in magazine shelves with drawer space for six months of back numbers. A window seat lends informality. Dutch door opening to the workroom and stack room may close it off yet provide some visual control. Below—The charging desk is large enough for several people to work in back of it. Closets with glass doors permit the display of attractive books. There are two desks for the librarians and two small tables for pupil assistants. There is an internal telephone connection in the workroom and an outside connection at one librarian's desk

ference rooms can be placed at the other. The conference rooms should hold at least one 3 x 5-foot table and six chairs. Bookshelves should be built in. The inner partitions should have the upper half of clear glass for light and to enable the librarian to see what is happening within. The classroom, to be used for teaching the use of the library, should accommodate one class, have a blackboard and bulletin board, and some bookshelves, and be provided with base plugs and dark curtains so that it may be used for visual purposes. Furniture should consist of a teacher's desk and chair and table, and armchairs for the pupils.

A door should lead from the library to the classroom, which should also have a door opening in the hall. All doors in the main library room should be placed so that the librarian will have visual control of students entering and leaving. In some libraries there may be double doors to the hall, with the charging desk facing them. In large libraries two separate doors are better, one for entrance, and one for exit. Shelves should be built between them, providing for overnight and reserved books. The large charging desk can be placed in front of these shelves, so that the pupil assistants can also attend to requests for books that have been so set aside. Conference rooms should have no outside exit; pupils enter and leave them through the main library room. All floors should be on the same level, since steps interfere with the moving of books and are dangerous and tiring for those who must use them constantly.

Shelving and Other Built-in Features

While it is highly desirable to have a library pleasing to the eye, the architect should be made aware that shelving must be placed on all available wall space; that space for books is the most important part of library planning. This means that radiation is to be within the walls, that paneling and pilasters are to be avoided. Shelving must provide room for growth for many years in the future. Other stacks for books even on the same floor are a last resource. The main library room is the place for the large collection, so that the librarian may not be handicapped with scattered book collections, and pupils may more readily learn their library resources.

If possible, shelving should be built in. It is more decorative, and the cost of it in the original building plans is less than shelving built in later. If the latter is to be the requirement, then it should be purchased from and installed by a reliable library equipment company. In either case, the measurements must be absolutely accurate.

If shelving is to be included in the architect's plans, then the correct dimensions must be carried out. Unless the librarian watches for this on the plans, she may find that someone has incorporated his own ideas with the result that not enough clearance has been arranged between shelves, or the shelves are too long, and trouble begins as soon as the library opens. Dimensions for shelving have been included in almost every article on library planning, but here they are again:

Length of shelf .... 3 feet (longer will sag)
Depth of shelf—for the majority of the books .... 8 inches
for encyclopedias, etc. .... 10 inches
for bound periodicals .... 12 inches
Thickness of shelf ⅞-inch
Space between shelves (in the clear) .... 10 inches
Base ....5–6 inches
Cornice ....2–3 inches
Total height for junior or senior high schools
6 feet 10 inches (provides for 7 shelves)
(to allow for a growing collection)

A shelf will hold approximately 8 books per foot. A wood backing for shelves adds to their appearance.

Shelving and drawers for current periodicals should be built in.

To deaden noise, an acoustically treated ceiling is desirable. The floor should be covered with cork carpet, not a hard linoleum, which is as tiring as a wood floor for the librarian, who is on her feet all day. One or two base plugs may be included, and if the library is in a system where there are other libraries and where outside communication with the public library or other agencies is necessary, a telephone outlet should be placed in the floor near the librarian's desk. Lighting fixtures may be selected by architect and librarian. The architect will know the requisite number and load of current.

Furniture

Tables and chairs are the first consideration. The tables should be 28 inches high in the junior high schools (with one or two higher for the larger pupils) and 30 inches high in the senior high schools. The tables may be 3 x 5 feet so that they seat two on a side and one at each end; or they may be 3 x 7 feet with three on a side and the ends free. The inclusion of some round tables and armchairs adds to the attractiveness of the room. Chairs for the junior level are 16 inches, and for the senior 18 inches high. The 3 x 5 feet tables should be arranged so that only one person must face the light. One or two smaller tables may be needed for pupil assistants.

The charging desk is most important and should come from a library equipment firm which designs them from long experience with library demands. It may be straight or U-shaped. Its shape and size depend on the size and type of library. The librarian's personal desk may be the regular office design with or without a side compartment for a typewriter. In a large library provide two desks. Swivel-chairs should accompany the charging and librarians' desks.

The size of the card catalog will be determined by keeping in mind what the size of the book collection will eventually be. Allow for five cards per book. A

Library of the E. P. Warner Junior High School

Above — Bulletin boards that cover the two upper shelves can be removed when the shelves are needed. An entrance and an exit door at either side of the charging desk control traffic automatically. The glass door at the end of the room leads to a workroom with shelving for stack purposes. This equipment includes a glass-topped display table

Gilbert and Betelle, Architects

Library of the H. Fletcher Brown Vocational High School

Left—Though the room may seem small, it meets the needs of this school, which has a program permitting only one class at a time to use the library. The charging desk stands between the exit and entrance doors

E. William Martin, Architect

smaller case will be desirable to be put in the workroom for a shelf-list or other card records. A legal size file with four drawers, two files for the large library, a book truck or two, also depending on the size of the library, will be necessary. Some librarians prefer a standing dictionary shelf; others like the revolving stand placed on a table. A table with a glass case for exhibition purposes is a moot question. They are expensive, they take up the room of one table that may be needed for working purposes, and they require a frequently changing set-up for display if they are to be of any educational value. A newspaper rack may be included if needed.

Decoration

Ceilings are usually white or very light cream. Walls may be light cream or some lovely shade of green or blue. There are many variations, but librarian and architect should go over the colors with sample panels submitted by the painters. The color of the woodwork is one of good taste and wearing qualities. Furniture should be of the best quality of wood, preferably oak. The finish may be a school brown, a dark oak, or any shade that will harmonize with the rest of the room. Venetian blinds have been put in a large number of libraries with satisfactory results. In all instances be sure to select colors that will not tire the eye. The floor—may I repeat—should be covered with cork carpet or a battleship linoleum that will give under the feet as well as contribute to silence. The ceiling should be acoustically treated. Bulletin boards are covered with materials whose color will harmonize with the finish of the room.

Selecting and Purchasing Equipment

All good library equipment firms issue comprehensive catalogs that are of great assistance in selecting articles of furniture. Representatives of these firms will also be glad, without remuneration or commitment on the school's part, to make a blueprint of the library floor plan copied from one secured from the architect. On this they will draw the outlines of all furnishings planned for, so that one can determine whether the desired furniture will fit the space which has been provided for the library.

Some school districts require competitive bidding on all articles that cost over a certain amount. This can be adequately taken care of, for, whether bid upon or not, all library furniture should come from library firms as one unit. No furniture should be purchased by separate items as has been lamentably the case in some instances—chairs from one source, tables from another, files and catalog cases from still another, the result being a hodgepodge of furniture likely to be inferior in quality, appearance and appropriateness. The irritation caused by catalog drawers that stick, by chairs and tables that will not stand up under constant usage, and the waste of money involved for later replacements, will all be avoided by purchasing from reputable library equipment companies.

Bids should require the submission of samples of drawers, chairs, a corner of a table with leg attached, as well as color and finish, etc., before the contract is awarded. The librarian, the architect, and the business manager can look these over before the final decision is made. All equipment should be inspected on delivery before it is accepted. Cheap furniture is a waste of public moneys. Good furniture will last indefinitely.

The library of any school is a center of activity contributing to all departments. It must be planned for the most efficient administrative purposes, with thought given to its appearance so that it will attract its patrons. It is a workroom, but it is also a room for restful leisure reading. A convenient library undoubtedly attracts readers.

ADAPTING OLD BUILDINGS AND PLANNING NEW ONES FOR THE EFFECTIVE USE OF AUDIO-VISUAL AIDS

By AMO DE BERNARDIS

Supervisor, Visual Education, Portland Public Schools, Portland, Ore.

IN education today there seems to be an ever-increasing emphasis on the use of audio-visual aids in the process of instruction. No longer are they considered fads and frills, but are regarded as an integral part of the teaching process. For a long time most of our education was concerned mainly with the verbal and abstract method of teaching, but in recent years there has been a decided shift to the more concrete methods of imparting information.

In the designing and construction of many of our school buildings, little thought has been given to the utilization of audio-visual materials. This is evidenced by the fact that few rooms are provided with methods of darkening, adequate electrical outlets, ventilation and acoustical treatment. The problem of securing proper facilities for the use of audio-visual aids is one with which all systems, large and small, are struggling. If audio-visual aids are to be effective tools in the hands of the teachers, provisions must be made for the obtaining and use of these materials. Many times the materials may be available, but the lack of proper facilities for use may discourage the teachers from using the aids after making one or two attempts.

The ideal situation is one in which all rooms are equipped for the proper use of these newer materials of instruction. For most schools this is out of the question, but with proper planning it is possible for any school to improve the conditions for use of audio-visual materials, making them more effective tools in the teaching process.

Selection of a Room

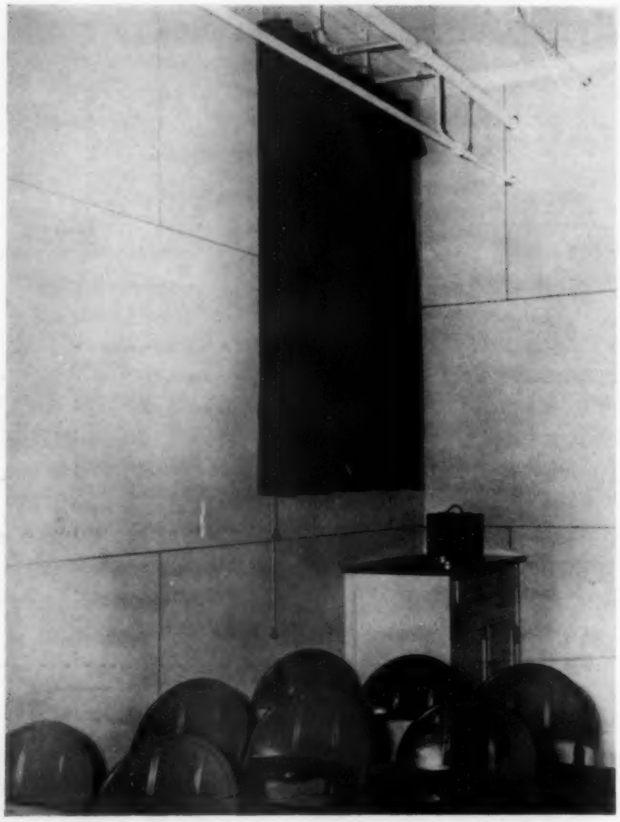
Usually the first room equipped for the use of audio-visual materials is the auditorium. In small schools the auditorium may lend itself to the use of audio-visual materials, but in larger schools where the auditorium has a larger seating capacity, its general use is not recommended. The teacher with an average class will feel lost in a large auditorium; besides, the room does not present a classroom atmosphere and a true learning situation. There is a definite tendency on the part of students to feel that the auditorium is a place for relaxation and entertainment, and this is not conducive to serious learning. The auditorium does have one main advantage in that it is possible to present materials to large groups at one time. This is highly desirable in cases where the program is of a general type, and thus a large group can be instructed at one time. However, educators feel that better results can be obtained with smaller classes in the visual field, as in all other educational situations, and have preferred to designate some one classroom as the audio-visual room. This room is scheduled in advance by teachers so that there will be no conflict in its use.

In this room is kept all the audio-visual equipment, so that it will be convenient for the teacher to use. Blackboards, chairs with provisions for writing, proper darkening facilities, acoustical treatment, adequate ventilation, all should be provided so that the teacher can concern herself with the lesson and not the mechanical details of locating and setting up the necessary equipment. If the use of this room becomes too heavy, it may be necessary to provide another, and so on, until eventually most of the rooms are properly equipped. A program developed in this way helps to keep the expense down to a minimum, for facilities are provided only as demand grows. The disadvantage in this method is that classes have to be moved from their regular room to the audio-visual room. This may cause confusion in the beginning, but as the novelty wears off, the students will realize that the audio-visual room is just another classroom, and will make the usual adjustment.

In the construction of a new building the architect should be instructed to have each room equipped for use of all types of audio-visual materials. Darkening facilities, electrical outlets, screens, acoustical treatment, proper ventilation are as essential in modern education as textbooks. In fact, they are precisely the means by which textbooks may be changed from inert printed matter to living reality.

Methods of Darkening

There are many ways in which to darken rooms. Some are better than others; the practical thing is to pick out the one that best fits needs and budget. One of the most commonly found methods of darkening windows is by the use of opaque shades. The usual practice is to use black shades. These are adequate, but do not satisfy the esthetic sense. A better device



is the new opaque shade in a variety of colors which darkens the room and at the same time adds to its appearance. If the shades are hung inside the casement, it is next to impossible to make a tight enough fit to exclude the light that comes along the edges of the shade. This can be overcome by providing strips of wood hinged to the casement so that when swung into place, they shut out the light at the edge of the shade. However, if shades are hung so that there is a 12- to 18-inch overlap on the adjoining shade, the wood strips are not necessary. The laps should point away from the screen so as to exclude any strong light from falling on the screen. Better still are the opaque shades that run in a metal channel at the edges. This is a very satisfactory way to darken rooms.

Shades seem to work more satisfactorily on double-hung rather than on casement type windows. If casement windows are opened for ventilation, the wind will soon tear the shades, owing to the constant blowing. One other point—most of the trouble in shades comes from the use of cheap rollers. Good substantial rollers are worth the extra cost, for cheap ones soon give trouble because of their tendency to sag.

Probably one of the best ways to darken rooms is by the use of drapes or curtains. For this, many kinds of materials can be used, from the costly lined velour to the lowly denim. A further advantage is that, besides darkening the room, the drapes add attractiveness to the room at all times. In the selection of drapes it is important that the material be durable and light-fast. In certain types of materials a lining may have to be provided to exclude the light.

The track should be one which will not get out of line or become distorted owing to the weight of the curtains. If cord pulls are used on the drapes, they should be of good quality so that they will stand the strain of continual use. Drapes should be fastened

Above—Drapes provide an efficient method of darkening rooms and also add to the appearance

Right—Dark shades with hinged slats to exclude light at edges provide satisfactory darkening facilities. Note acoustical tile on ceiling

securely to hooks so that they will not tear loose, and they should be hung so that there is a 6- to 8-inch overlap at the center and at the sides of the window.

A very practical material to use for the making of drapes is blue or brown denim. Even if this material is used in single thickness, very little light filters through. To save material and simplify installation, it is possible to make an over-all drape by providing a track along the ceiling of the room, set out 10 to 12 inches from the window. The material is attached to this track, which can handle two or more sets of drapes, depending upon the size of the room. When there is no need for darkening the room, half of the drapes are drawn to one end of the room and the remaining half to the other end. Curtains hung in this manner have a distinct advantage in that they provide adequate ventilation if the windows are left open slightly at the rear and front of the room.

Plywood can be used satisfactorily in the darkening of rooms. If a permanent darkening is desired, the problem is simplified in that the plywood need only be cut to fit the window casement and then securely fastened in place. If the room is not provided with fresh air intake and foul air exhaust, some provision will have to be made for proper ventilation. This can be done at the rear and front windows by providing a hinged panel at the top of the windows which may be opened when necessary. A light trap type ventilator can be installed near the top of one or more windows to give better ventilation. However, if the room is to be used for other classwork as well as visual work, provision should be made for admitting light to the room. This can be done by fitting the plywood panels into wooden tracks so that they can be made to slide up or down. Cords attached to the panels and run through small roller cord stops will allow the panels to be stopped in any desired position. The advantages of the plywood method are cheapness, durability, and opacity.

If any of the above methods are not practical in any given situation, still another method of darkening rooms at a minimum of expense is through the use of building or tar paper. Frames are made to fit the window casement. These should be cross-braced so that they will not twist and rack out of shape. The building paper is then tacked or stapled to these frames and the frames put in place. Friction serves to hold the frames in place, but if a more secure fastening is desired, hooks and screw-eyes can be used. If the room is to be used for purposes other than projected material, then the problem of storage of the frames is one that will have to be taken into consideration. This tar-paper method provides a way of darkening rooms which is within the reach of all, and if a crew of boys is given the job of seeing that the frames are in place and then put away after use, little trouble will be encountered. Many times it is desirable to darken some room temporarily. This can be done satisfactorily by tacking building paper to the window casement. However, this is not recommended unless it is an emergency measure, because if it is done too many times it will mar the woodwork.

Lights that can be controlled from operator's position are a definite help and a safety device

An even cheaper method sometimes used in darkening rooms is by painting windows with water or oil paints, but this is not recommended, since it creates more problems than it solves.

Electrical Outlets

The installation of electrical outlets in the classroom is one which will entail some expense. In the modern home of today, outlets are found on every side of the room, but this is not so in the classroom. With the use of radio, projection machines, recording apparatus, transcription players, it is important that the room have proper power outlets. An outlet should be provided at the rear of the room so that it is possible to operate projection equipment from the back without running long extension cords. An outlet should be located at the front of the room for the use of radio, phonographs, and recording devices. One item that should not be overlooked in the placement of electrical switches in the classroom is to provide one at the rear of the room so that the lights as well as power may also be controlled from the operator's

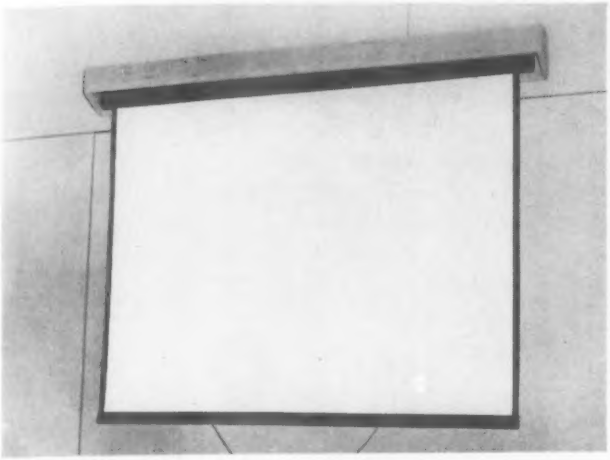
position. This is not only handy for the teacher, but is a definite safety measure in that the teacher can turn on the lights in case of an emergency without running to the front of the room. Radio and ground connections should be made available in each room if this modern aid is to be made effective, although this is not as essential as it used to be. Many radios are now being made with a built-in antenna, which eliminates this difficulty. If a new building is being planned, a conduit for an inter-room communication system should be included, no matter whether immediate use is contemplated or not. The installation of this type of equipment after the building is up will cost considerably more than if it is put in during the process of construction. The question of what to do with an older building relative to electrical outlets is one that concerns most of us. The problem can be handled in various ways. The easiest and most frequently used, but not the handiest, is to use extension cords from the nearest electrical outlet. Many times this outlet is in some other room, which causes considerable confusion. Duplex outlets can be installed at the switch that controls the room lights, if the circuit has the capacity to carry the extra load. It is best to check with the electrical code for any particular community relative to this matter, for many cities do not allow this.

Another method that is used quite often is the installation of wiremold or conduit from one of the lights in the room. It is important that this circuit should not be connected to the switch that controls the lights, but should be a separate circuit. Although the conduit is in the open, it will not detract from the appearance of the room if the work has been properly done. The best way of installing new outlets is by the use of concealed conduit, but this is costly and may not be feasible for many schools. In most cases it will not be possible to run-in another switch for the control of the room lights at the back of the room, but this is not absolutely essential for the use of projection equipment. It is best to keep away from the use of long extension cords that will interfere with free passage along the aisles.

Acoustical Treatments

The matter of acoustical treatment of rooms is one which should be considered in any new building. With increased use of radio, phonograph, transcriptions, sound pictures, and inter-room communication systems, the problem of acoustics is highly important. In a new building this can be taken care of in the original plan, but what can be done in the old ones? If the acoustics are very bad, the solution is to apply acoustical board to the walls and ceilings. This can be purchased in a variety of thicknesses and degrees of softness. It is best to confer with a local contractor or architect as to the best kind to use. Another very satisfactory and inexpensive method of sound-treating a room is the use of curtains suspended from the ceiling. Monks cloth or similar material serves the

Classroom in which acoustics have been improved through use of hangings over walls and blackboard



Beaded screen which can be used in different rooms. Hooks are provided in each room to hang screen. Box is optional

purpose very well. Acoustical treatment is important in any room, and is absolutely essential in a room where recording equipment is being used for speech, dramatics, or music work.

Ventilation

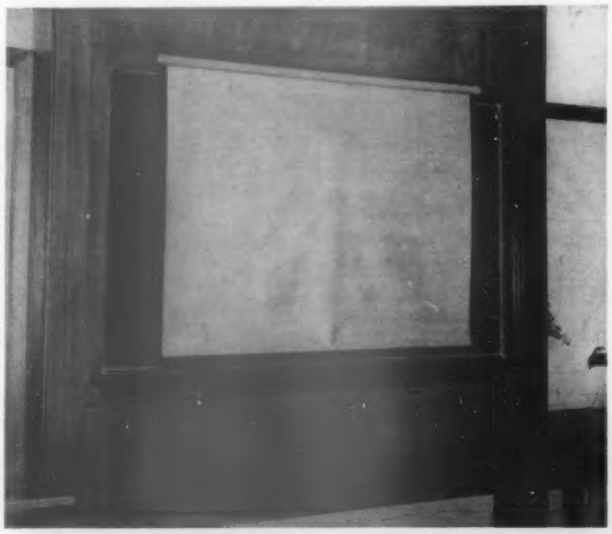
In the use of projected materials the problem of ventilation is a highly important one. In planning a new building it is well to provide for fresh-air intake and foul-air exhaust. Some new buildings are providing air-conditioning systems, which is the ultimate in room ventilation. However, in buildings where a warm-air system is used, the problem of proper ventilation is a very trying one, especially when the room is darkened. Ventilation can be improved by opening a window at the front and the rear of the room. If the windows are not opened too far, little trouble will be encountered with the admission of light into the room. If too much light is admitted into the room by opening the windows, exhaust fans can be mounted in the windows to provide ventilation. Provision for ventilation can be made at the tops of the windows by installing a light trap-type of ventilator. This can be constructed at a minimum of expense in the school shop. For the average class, window-sill types of air conditioners are very practical for classroom ventilation. Only one or two windows need be treated.

Screens

All projected aids require some type of screen on which the picture can be shown. There are on the market many types of projection screens that can be purchased at a nominal cost. The specifications will depend on the size and shape of the room. A long, narrow room can use a beaded screen to advantage. This same screen would not work well in a room that is approximately square, since beaded screens require that the audience be seated within a 30-degree viewing angle. If the seating arrangement is such that a wide angle is necessary, a flat white or similar type of screen should be used. For further information on beaded screens refer your request to any screen manufacturing company for complete details.

The screen should not be hung so high that it will cause discomfort to those viewing the pictures. Nor should the chairs be so close to the screen that the pupils will have to strain their eyes. The problem of supplying each room with a screen is an expensive one and can be overcome by providing two or three portable screens for a building. These can be used in any room. Two types of portable screens are available, the tripod, and the wall type. The tripod screen has an advantage in that it can be placed in any desired position. For the wall type, hooks should be provided in each room so that the screen can be hung with minimum effort. Both types of screen can be had in either the beaded or the painted surface. Many schools are using a roller-shade form of screen. This can be purchased in a variety of surfaces. Certain kinds of screens can be made by the industrial arts students, and quite satisfactory ones, too. Ordinary window shades with a flat white surface can be purchased and mounted with the regular brackets on a 1 x 4-inch strip of wood the proper length. Two heavy screw-eyes are placed along the edge, which coincide with hooks in front of the room. This makes a practical and inexpensive type of screen. Still another type consists of plywood, ½″ x 36 x 48, painted with flat wall paint. In an emergency the blackboard or the back of a map can be used as a screen.

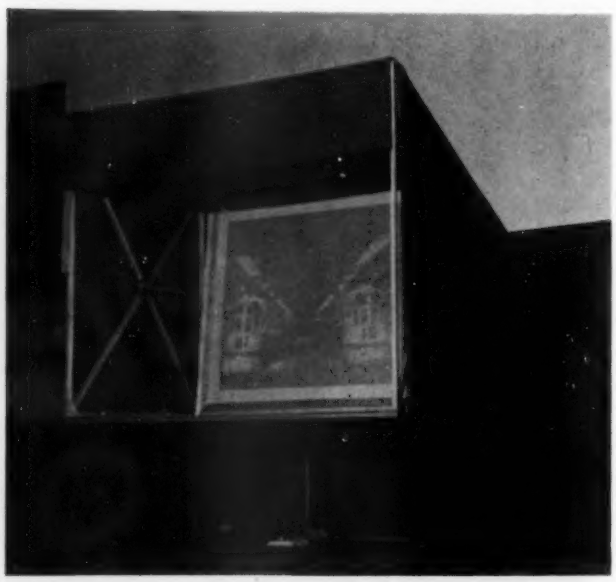
Many times it is not feasible to darken the room for the use of visual aids. This obstacle can be overcome by the use of a projection tunnel, which is a



Ordinary window shade mounted on sliding blackboard will serve as a screen where budgetary limitations make it impossible to purchase one

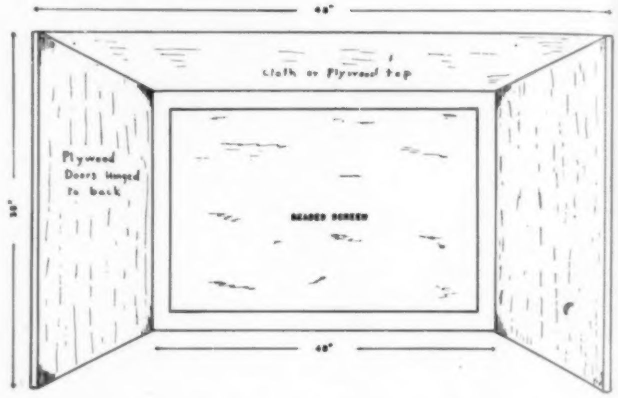
screen shielded at the top and on each side by the use of plywood or frames covered with cloth. Some projection tunnels are constructed with the projector at the rear of the tunnel, and the image projected on a translucent screen. Other tunnels have a mirror arrangement, which takes an image thrown by a projector from the front of the tunnel and reflects it on a translucent screen. The projection tunnel has its greatest advantage in the shop or gymnasium, where it is not always practical to darken the room. Of course the tunnel limits the projection to a relatively small-size screen, but for small classes the tunnel is practical and a solution to the use of projected materials in a lighted room.

If a light-colored plastered wall is available and the room can be darkened, the wall will serve as a screen. The problem of recommending any one type of screen is difficult. Generally speaking, if the room conditions are not too adverse, a beaded screen will give the best results. With the use of beaded screens, or screens with highly reflective surfaces, it is possible to use certain types of materials, such as lantern slides, film strips and even motion pictures in a room darkened only with the regular window shades.



Projection tunnel which can be used in room that is not darkened. Projector is in front of tunnel in this type

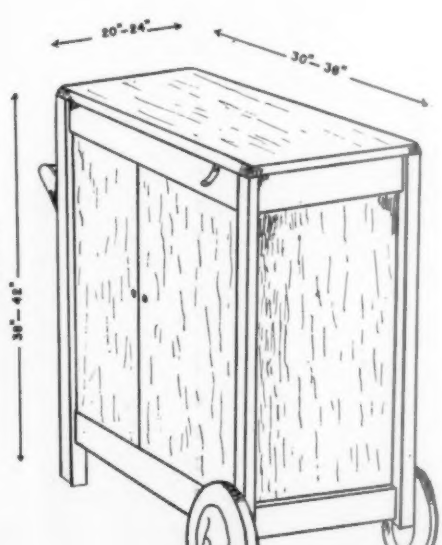
One of the problems in the use of visual equipment is that of providing adequate and substantial tables for the projector. Many makeshift devices are used, but it is better for all concerned to obtain a regular projection table for use with projection equipment. This table should be constructed so that it can be moved from room to room with a minimum of effort. If the building has more than one level, a projection table should be available for each floor. The table should include space to carry cords, projector, speaker, spare lamps, and other items necessary for proper projection. The cost of these tables is nominal, especially if they are constructed in the school shop.



Shadow screen, made so that it can be hung on the wall. Plywood doors pull out and prevent light from striking screen. Surface of screen may be beaded or flat white. When not in use doors fold in to protect screen

Aids Must Not Be Burdensome

It is difficult to make any specific recommendations which would cover the problems of all schools. It is hoped that the points brought out in this discussion will help solve some of the problems that schools are facing in the use of audio-visual materials. Too often we postpone action until the ideal situation is available, when we could get along quite well with a modified plan. Audio-visual materials are here to stay, and all schools should make some provision for their use, for they are effective tools in the hands of the teachers. But whatever is done or provided should lighten the burden of the teacher, not increase it.



Projection table provided with wheels, tilting top, and room for projector

HOUSING AND EQUIPPING THE ACTIVITIES PROGRAM

By HARRY C. McKOWN

Editor, School Activities Magazine

IN the planning of new school buildings appropriate provision is usually made for space and equipment for some of the so-called extra-curricular activities. All modern schools provide a gymnasium and an athletic or playing field; an assembly room or auditorium complete with stage, scenery, lights, curtains, etc.; often a music room, together with the more cumbersome instruments, and music, racks, uniforms, etc.; and, to some extent, these schools also provide space and equipment for publications, thrift, store, and a few other activities. Often an "activity room," somewhat suitable for certain types of group affairs, is also included. However, despite these favorable beginnings, much remains to be done before this program is adequately housed and equipped. Just what, how much, and where? These questions are easy to raise, and very difficult to answer.

Paucity of Literature

Very little has been written on this subject. The present writer in preparation for this article examined all the books in the general field of extra-curricular activities and a number of books on school planning, building and administering, checked through the files of *School Activities* and other professional magazines, and corresponded with a number of practical and theoretical leaders in the field, and he found practically nothing—except, of course, what related to the activities suggested in the foregoing paragraph. Frankly, it was a discouraging preparation.

Probably the main reason for this paucity of literature on the subject is somewhat obvious—the lack of standardization of the activities themselves. Although it is possible to state with considerable exactness the amount of blackboard space, or the number of drinking fountains, or the area of an athletic field necessary for a particular-sized school, yet it is not possible to propose such definite standards for the extra-curricular program because this varies so widely from school to school. Consider the student council, for example. Some schools do not have this body, and in those that do it is varied in type and organization so that, even in schools of the same kind and size, its membership ranges from a small number in a single-committee type to a great number in a bi-cameral form. Consequently, about all that can be done here is to present a few basic principles and some more or less general suggestions pertinent to three or four of the now largely neglected activities.

Basic Principles Underlying the Housing and Equipping of Activities

1. *Activity space should be permanently assigned.*—One of the greatest weaknesses of the average extra-curricular program is to be found in the housing of its various elements. In many a school, outside of physical, music, dramatics, home room, and auditorium activities, no permanent "houses" are assigned—activities are shifted around to any classroom, corner or table that happens at the moment to be unused or unoccupied. Naturally, such sloppy housing hardly makes for a well-organized, articulated and dignified schedule of activities. In short, in so far as it is physically possible, an activity should be assigned to a permanent meeting place where the necessary equipment, supplies and material are available and where the activity itself is safe from interruption. Of course, in many instances this same space may be utilized for more than one activity, if these are scheduled at different periods. However, even in such cases, permanent and private equipment, as well as storage space, should be provided for each individual activity.

2. *The space assigned should be neither too large nor too small.*—This apparently witless statement is important, judging by the extent to which this idea is ignored. Naturally, the size of the space desirable depends upon the organization—the size of the group, the equipment and materials utilized, and the activities engaged in. Obviously, the space should be large enough to accommodate the activity without inconveniencing the participants—requiring them to stand, sit two in a seat, etc., and large enough for adequate storage space if necessary. On the other hand, it should not be too large. For instance, the auditorium or a large classroom is no place for the meeting of small student committees, council, club or staff. Psychologically, such a setting is disconcerting, to say the least.

3. *The activity room should be conveniently located.*—Too often activities are assigned to some unused space, often in an out-of-the-way place. Perhaps in the case of smaller groups this would not be undesirable—in certain instances it might even be

helpful. However, such an activity as a school bank or store should be located where it is easily accessible. Further, the council room should be convenient to the school offices where records and authority are near at hand, and where questions concerning school policy, schedules, calendars of events and the like can be settled promptly. Also, such location provides adequate and close supervision where it is necessary.

4. *The space utilized should be private while the activity is in session.*—Distraction and disruption are the sure concomitants of a setting in which more than one activity uses the same space at the same time, or where students and teachers frequently pass through this room. To illustrate, a dramatic cast or a music club using the stage could hardly concentrate if another group of students were using the rear of the auditorium at the same time, or if students and teachers were passing freely through the auditorium on their way to other affairs; nor could a council give undivided attention to its business if some other group were meeting in another part of the same room. Privacy is essential.

5. *Adequate permanent equipment should be supplied by the board of education.*—One of the disgraces of school housing is that often the extra-curricular program is somewhat satisfactorily housed but inadequately equipped. A good example is the practice of providing an auditorium with an unequipped stage, leaving the school itself to face the problem, which it frequently does by raising funds through such cheap methods as promoting tag days, staging shows, selling soup, peanuts, scrap-iron and rags, etc., selecting and purchasing curtains, furniture, draperies, backgrounds, etc.; and that this problem was amateurishly solved is evidenced by the stage equipment of many a school auditorium. These items are as essential to an auditorium as the seats, and they should be selected by competent persons and paid for by the school district. Similarly, filing cabinets, furniture, typewriters and other necessary equipment for activities should be provided by the school authorities, not by the students or their friends.

Housing and Equipping Specialized Activities

As suggested earlier, because of the many variables involved, it is not possible to indicate in exact terms just what an activity requires in the way of space and equipment; however, it is possible to state these needs in general terms upon the basis of which the local school can determine its own specific needs. Further, owing to the limitations of space and to the fact that the athletic, music, dramatic, and assembly activities are already somewhat adequately provided for, special attention will be given here to a few of the activities which too frequently are neglected.

The Student Council.—This organization, the center of the activity life of the school—the basic element in the practice of educating for membership in a democracy—is, in nearly all schools, entirely homeless. The council of the average school meets in some classroom—usually that of the sponsor, in the auditorium, gymnasium, office, or some other unsuitable place that happens to be vacant. A word about these possibilities.

The classroom, most frequently used by the council as a meeting place, is, because of the position of the seats and the teacher's desk, and the carry-over atmosphere from class use, not propitious to the development of democracy. It smacks of the autocracy to be found in the classroom. If the council is large, it must meet in a large classroom or in the auditorium or gymnasium. Perhaps, owing to the size of the group, some such arrangement is necessary. However, it is far from good.

What does the council need? A properly equipped room of its own. Basically, such a room must be conducive to the development of a democratic feeling. Hence, it should not be classroom-like, but council-chamber-like. Movable chairs, which can be grouped in a semicircular pattern, are desirable if the group is of any size; and a table—NOT a teacher's desk—at which the officers may sit and work, is necessary. If the council is small, it can be seated around this table. Other equipment, such as a blackboard, calendar, filing cabinet, and perhaps a typewriter, is desirable. This room, obviously, should be used by various other activities as well as the council. Providing a room which was utilized for but a few periods a week or month would not represent building economy.

School Clubs.—Generally speaking, specialized school club rooms cannot be provided for all groups because (1) too many would be required, (2) they would be used relatively little; clubs meet only once or twice a week and usually at the same period, and (3) some of the other school settings—gymnasium, auditorium, stage, shops, and music room, for instance, are both appropriate and available. Also, classrooms can be used for certain types of clubs. However, for other kinds of clubs, such as recreational, special rooms might be provided, equipped with tables for checkers, chess, and similar table games, and space for the various kinds of floor recreations. In general, school clubs are fairly well housed and equipped.

Publications.—There are four main types of school publications—newspaper, magazine, yearbook, and handbook—all of which require a somewhat similar type of space and equipment.

If the school has courses in journalism or printing, the customary procedure is for the publication staff to use either of these two settings, and they are probably somewhat adequate for ordinary usage. But in the small school the staff generally has to use a va-

cant classroom, a table stuck around somewhere, the principal's office, or some other equally unsuitable setting.

Certainly, publications should have a permanent home, and one properly equipped. The size of the room and the amount and kind of equipment will depend, obviously, upon the type and size of the publication, the circulation, staff, and other relevant details. The absolutely essential articles of equipment are desks and tables, filing cabinets—standard size for materials, small size for finance and circulation data, chairs, typewriters, cash box or drawer, racks and files for exchanges, bookcase with pertinent books, and storage space for back numbers, supplies, materials, etc. Duplicating and stapling devices are necessary for the production of certain types of non-printed publications. In larger schools an addressing machine, together with plate-making devices, and an adding machine may be necessary equipment for the publication office.

School Bank.—The various forms of school banking fall easily into two main types: (1) the "thrift system," usually installed by some outside thrift, bank, or savings agency, in which the teacher herself, sometimes with the help of her students, receives savings and sends them to the office which transfers them to the bank; and (2) a school "bank"—a realistic institution in which the student himself makes his deposits and withdrawals. Because nearly all the activities of the first type are carried on by the teacher in her classroom, no special space is required, and no materials or equipment except those supplied by the sponsoring agency. However, the school bank requires both special space and equipment.

In order to be a dignified and respected institution, a school bank must, first of all, look like a bank. A plan in which the students deposit money in the principal's office, in some teacher's classroom, or over a table in the corridor, does not represent an intriguing banking plan. A school bank requires a permanent setting, one definitely and deliberately designed for banking purposes only. The space should be large enough to accommodate the business. The equipment should include the usual bankers' counters, grilled windows, money drawers, customers' counter, filing and recording system, and perhaps adding machine, typewriter and safe. The more complicated devices—comptometer, bookkeeping machines, etc., are not necessary in any except the largest banks. Also, a large bank will require a private office in which details of certain banking procedures may be carried on.

Frequently the commercial students are in charge of the bank, and as a result too often it is located in the commercial department in some not-too-accessible place. Such a location will militate against its effectiveness and usefulness. Convenience to trade is basic.

In conclusion, some extra-curricular activities are already very well provided for in the matters of school space and equipment, but certain others, particularly the student council, are still homeless. Doubtless, as school authorities recognize the necessity of providing for their entire program, extra-curricular as well as curricular, these lacks in our present building and equipment plans will be properly taken care of.

"DON'TS" FOR THE SECONDARY-SCHOOL THEATER

MICHAEL M. HARE

Architect, New York City

FROM an economic point of view perhaps, it is unfortunate that the theater for the secondary school can never be a mere miniature of its close relation, the community and the college theater. The most common error in small-theater planning is to assume that the stage to be used by "a mere school" may be smaller. Some school stages seem to be planned on the fantastic theory that stage areas should be proportioned to the age of the actors. All too often they are planned with the equally fallacious idea that the stage should be proportioned to the size of the auditorium. Common sense should show that the size of a stage has but little relation to the number of audience seats or to the age of the players. It is determined by entirely different factors. Even though for these reasons stage area varies but little, this must not be taken to mean that those who foot the bill for a secondary school theater will have to dole out the same amount of money as if they had provided a complete professional theater.

The Problem of Stage Size and Lighting

This criticism of present small-theater planning refers principally to the stage areas proper and in a lesser degree to the facilities backstage. Where the auditorium is concerned, the problem is different, as, in general, the smaller an auditorium, the more successful a production can be made, providing that it is not necessary to run the theater as a profit-making enterprise.

To return to the problem of the stage. It is an unfortunate fact that incipient actors will require as much if not more room for scene shifting and storage than the professional company. Despite all this, there are very definite economies that can be made in the school theater and in its stage that are not as yet possible in the professional theater, conditioned as the latter has been by high real estate values in New York City and the resulting habit of high stage lofts and narrow stage widths. These conventional high stage lofts are pretty efficient for scene shifting and may be put to good purpose for scenery storage, but they are most wasteful of space in any scheme where multiple use of all the facilities is desirable. Stages of a different type mentioned later have interesting possibilities.

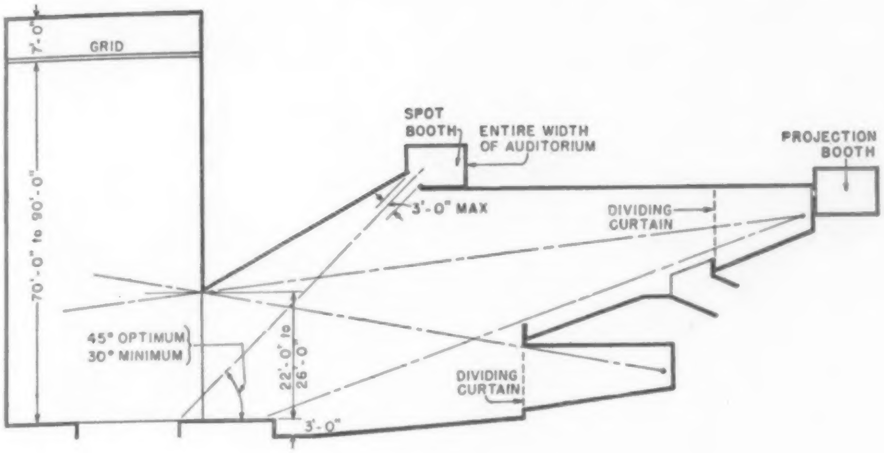
Another economy that may be made with safety lies in special lighting equipment. Money that can be paid out for lighting equipment is endless, and in one moderate-size theater alone it can reach a figure as high as $50,000 without being wasteful. Yet, in the case of the school theater where funds are restricted, it is obvious that it is much easier to add lighting equipment at a later date than it is to add space. It is possible to put on interesting and successful productions with only the most primitive equipment if there is sufficient space, but the reverse is not equally true.

The Real Purpose of the School Theater

In general, while planning the school stage it must always be kept in mind that the object is character building and fostering the development of community life, rather than the training of actors. Therefore, the only time when the school theater should be looked upon as closely paralleling the professional theater is when it is necessary to amortize the cost of the building by leasing it to professional road companies. This would weigh the scales in favor of the high stage loft and of course would dictate an increased size for the auditorium. In fact, it would mean that between 1,000 and 1,500 seats would be needed in order to provide sufficient admission money. This in turn means the expense of arranging for a variable capacity of auditorium, for school and community shows will not command that audience, and nothing is more destructive of "good theater" than empty seats. Under these circumstances, the auditorium must appear full when seating 600.

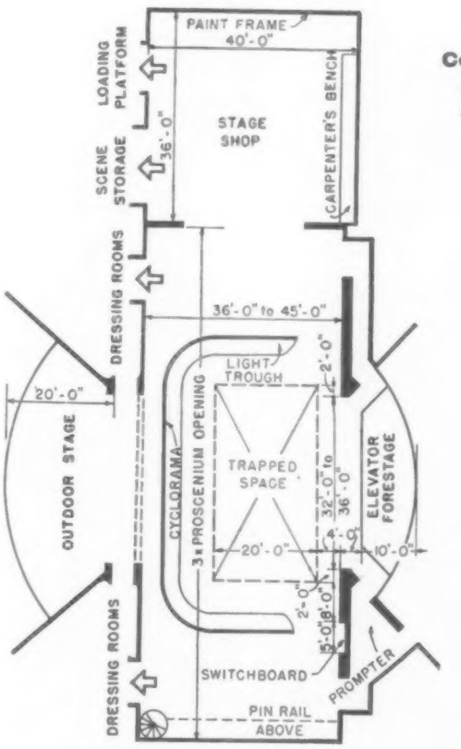
However, it is most doubtful whether the road show will ever again come into its own sufficiently to justify warping the school stage for this purpose. Rather, it is better to foster the development of a local community group which will lease the theater and will have more nearly the same requirements. All this therefore makes me most partial to the horizontal stage, or what I call the encircling stage (see illustration). In this plan the cubic footage, which would normally be up in the air in a professional theater, can be at stage level and therefore have multiplicity of use for rehearsals, building of scenery, etc. The same cubic footage of stage must be provided in any event, but if it is at ground level it will lower the cost, because it will permit the restriction of facilities that would otherwise be necessary.

Having been entirely dogmatic on the problem of stage size, I shall now recant in part and admit that

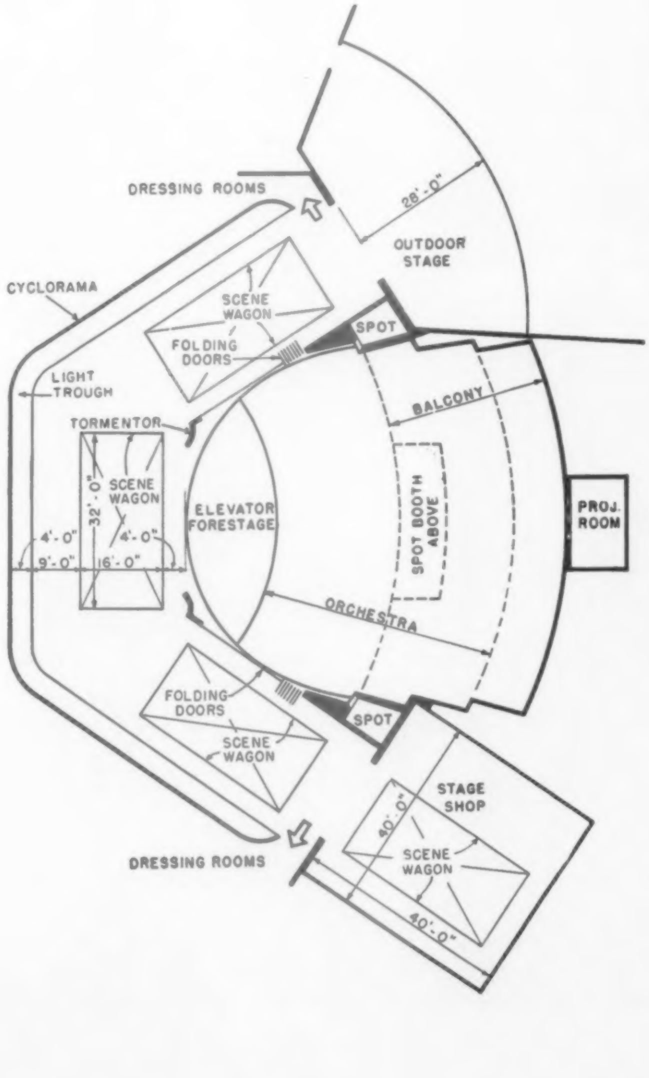


Heavy dotted line in section of encircling stage indicates variable position of forestage. Cyclorama shown in conventional stage must be flown when scenery is brought in from shop. Trapped space on conventional plan, and center position of scene wagon on encircling stage, indicate acting areas. Scene wagons travel on tracks whose positions must be carefully plotted so wagons will clear cyclorama and tormentors. Since one purpose of the encircling stage is to facilitate productions other than the usual "picture-framed" type, emphasis on proscenium as a frame should be reduced to a minimum

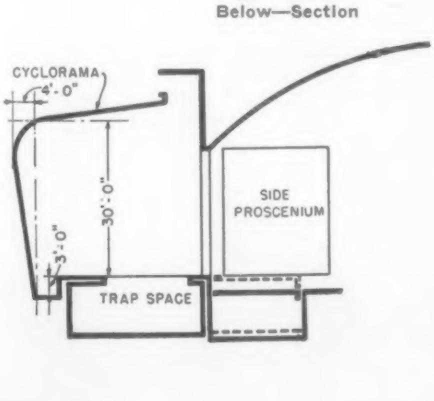
Courtesy of the Architectural Record



Conventional Type of Stage
Left—Plan
Above—Section



Encircling Stage (Wagon-Type)
Right—Plan
Below—Section



Right—The theater lounge at Wisconsin illustrates a multiple-use room. This space is used for rehearsals, both musical and theatrical. The furniture is made in units so that it can be combined either for use in the entr'acte or by groups giving special parties

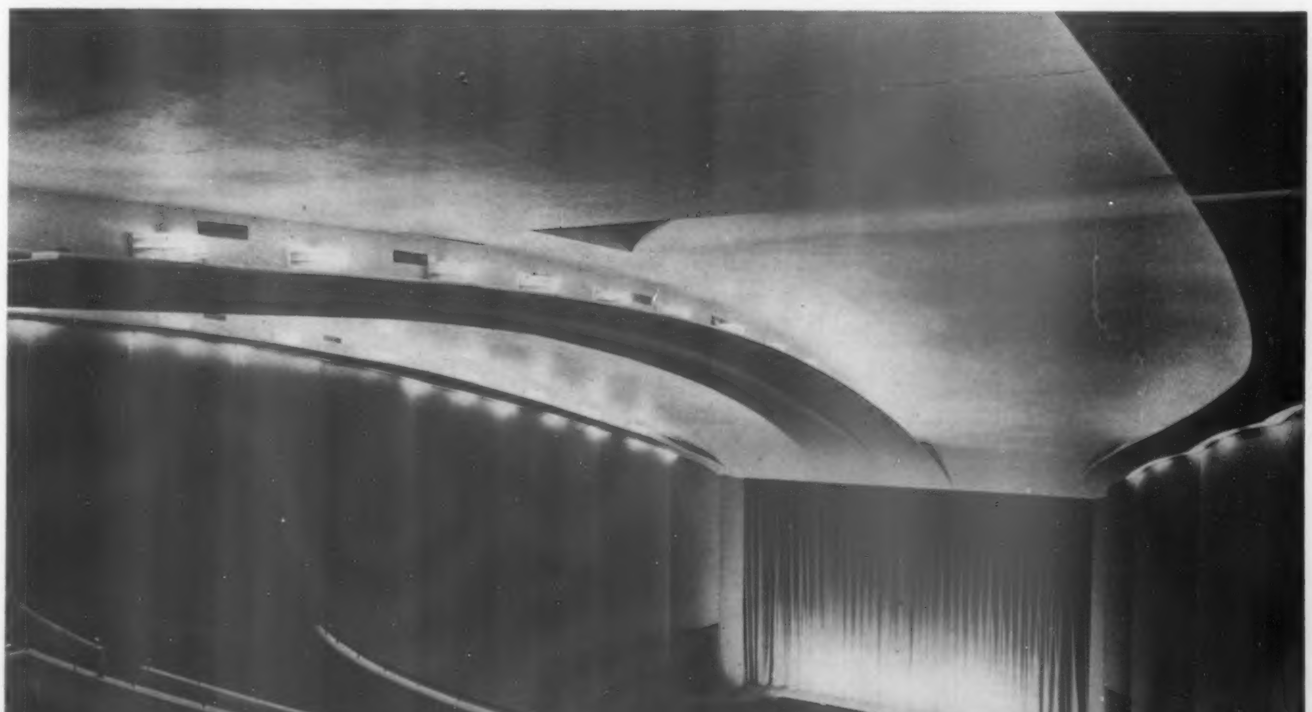
Below—A small theater installed at the University of Wisconsin as an experiment in flexible stage arrangement. The stage is of the encircling type, elsewhere illustrated by diagram. It is, however, very restricted in size

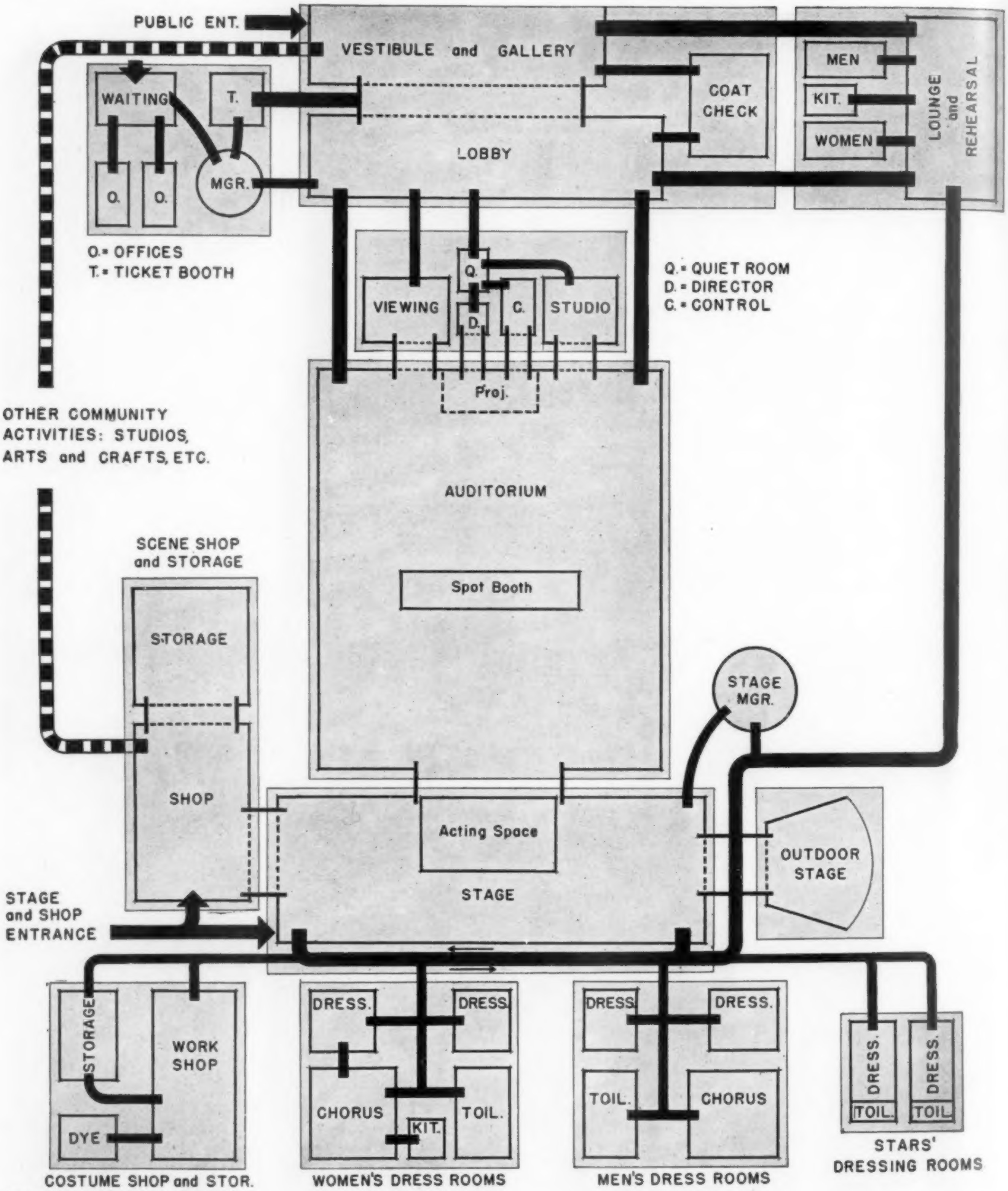
Michael M. Hare, Corbett and MacMurray, Associated Architects. Lee Simonson, Theater Consultant.

Left—The lobby of the Experimental Theater at the University of Wisconsin illustrates the large amount of entrance space needed even for the most limited auditorium

Below—An acoustical expert, in association with the architect, determined the forms for the large auditorium at the University of Wisconsin

Charles Potwin, Acoustical Expert. Michael M. Hare, Corbett and MacMurray, Associated Architects. Lee Simonson, Theater Consultant.





Courtesy of the Architectural Record

Organization of a Community Theater

If community activities not directly related to the theater are to be included, it is desirable to provide access from them to gallery exhibition space; and to isolate their quarters, along with the noisy stage or scene shop, in order to simplify the problem of reducing background noises in auditorium. Additional stage and shop entrances may become necessary. Parts of radio unit (viewing room, studio) can also serve as discussion rooms.

for purely experimental purposes it is possible to have a much smaller stage. The chief difficulty, however, is that such a stage is only a supplement to a larger stage and is only really useful when the large stage is occupied and the small stage is used by experienced directors with a great deal of imagination as a proving ground. Its limitations are too great, particularly if, as in a school, there is a desire to use as large a cast as possible.

Though I have said that, aside from stage and backstage areas, the facilities could be reduced indefinitely in area (provided only that the building code is not violated), in actual practice this is not desirable. It must be kept in mind constantly that the school is not just hawking entertainment. At that game the local movie house will win every time. To the secondary school, particularly in these days, goes the job of education in democracy and in community living. It is the school's job to bring up citizens to know one another and view one another's problems with understanding, and therefore it is eminently desirable that theater activities be used as media to draw people together not only on the stage but in the lobbies. Theaters should be used to draw audience and actors together in ways that they have not previously tried. Lobbies and lounge spaces should be arranged so as to invite discussion. Wherever possible, they should serve as art galleries as well as lobbies. Furthermore, the encircling stage is particularly recommended for schools because it tends to break down that conventional barrier between actors and audiences. The object in the school theater is not to achieve a realistic escape, but to promote joint activity; in fact, I think that if the Elizabethan practice of heckling from the stage floor could be revived, it would be a good thing. The objection to this will be raised that student actors are sufficiently terrified without this added, but in the first instance what is frightening is a sea of faces all blank and silent that you believe belong to people that come to criticize the show rather than to join in it.

Things to Avoid and Prevent

So much for the general requirements and philosophy. Other "don'ts" are:

Don't fool yourself into thinking that acoustics will take care of themselves. See that your architect employs an adequate consultant. It is not possible to use the acoustical specification of some other theater and expect it to give satisfactory results. Each problem differs. Furthermore, it is seldom desirable to take the recommendations of the manufacturers of acoustical material, since, with all the good-will in the world, they have a natural tendency to run up the bill and give you what is called a "dead house."

Don't let your architect express his whimsy in the forms and decoration of the auditorium. The important thing in an auditorium is the people and their relation to the stage, not the architecture, which is good only inasmuch as it is unobtrusive.

Don't build the theater without air conditioning. John Q. Public has had the benefits of air conditioning in movie theaters so long that he will not tolerate anything less. Men and women will sweat and fume at stale air which fifteen years ago they would not have remarked upon. The result will be that everything will seem less perfect to them than it is, because they are so uncomfortable.

Don't put windows in the auditorium. This is ridiculous, and there are always light leaks. Furthermore, if the windows are open, as they undoubtedly will be if they exist, they destroy the air conditioning.

Don't skimp on workshops and rehearsal spaces. The benefit to be derived from school theatrical activities is not confined to the performance. Students who for one reason or another do not act can join in the scene-making, costume-making, and related activities. These have an obvious social value.

Don't fail to provide adequate trap spaces below the entire acting area.

Further *don'ts* could be listed *ad nauseam,* but to do so would only lead to the conclusion that any "don't" not specifically mentioned was permissible. However, it may be said in conclusion that if the recommendations above are followed in general, and if common sense dictates the sight lines so that at least two-thirds of the acting area may be seen from any seat, then the difficulties which you may run into with your finished theater will be ones which can be modified with time and money. On the other hand, if these preliminary *don'ts* are disregarded, you will end up with some malady for which there is no cure other than selling the building to the local Tiddledywinks Players and building a new one.

BIBLIOGRAPHY

Hare, Michael M.: "Community Theaters." Building Types Section, *Architectural Record,* Oct., 1940.

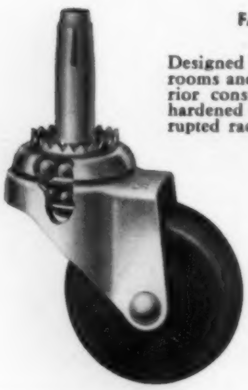
Potwin, C. C., and Schlanger, B.: "Coordinating Acoustics and Architecture in the Design of the Motion Picture Theater." *Journal* of the Society of Motion Picture Engineers, Feb., 1939, 156-67.

Simonson, Lee: "Theater Planning." *Architecture for the New Theater.* Theater Arts, 1935.

FAULTLESS CASTER CORPORATION

DEPT. SU-42

REPRESENTATIVES IN PRINCIPAL CITIES — **Evansville, Indiana** — CANADIAN FACTORY: STRATFORD, ONTARIO



FAULTLESS DOUBLE BALL BEARING CHAIR CASTERS

Designed especially for use on chairs in offices, study rooms and libraries, where quiet is essential. Of superior construction, this caster has two full rows of hardened ball bearings swiveling freely in uninterrupted raceways. Low over-all height, dust-proof construction. Bearings lubricated at factory. Furnished with either Ruberex (cushion tread) or Rockite (hard tread) wheel. A very easy swiveling caster.

Copper Oxidized Finish

Style No.	Kind of Wheel	Diam. of Wheel	Wt. Per Set of 4
2478	Ruberex	1 5/8"	1 Lb. 6 Oz.
2479	Ruberex	2"	1 Lb. 10 Oz.
2778	Rockite	1 5/8"	1 Lb. 6 Oz.
2779	Rockite	2"	1 Lb. 10 Oz.

Packed one set in a box.

Faultless Medium Duty Truck Caster has two complete ball races, using best grade balls, all bearing surfaces hardened, special king pin construction, dust-proof. Furnished with Ball Bearing Ruberex wheel. A very strong, durable caster.

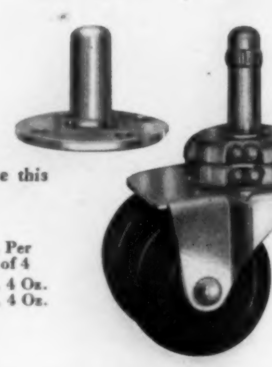
Green Lacquer Finish

Style No.	Diam. Wheel	Size Plate	Lbs. Cap. Each
422-3	3"	3 1/8" x 4 1/8"	75
422-4	4"	4" x 4"	100

Packed in bulk.

FAULTLESS DOUBLE WHEEL PIANO CASTER

This double wheel, double ball bearing, noiseless Piano Caster has two rows of ball bearings operating in lubricated hardened raceways. Used with No. 98 socket. Wood Ferrule for use over socket for large drilled hole. Supplied with a plate, where this type is needed.



Copper Oxidized Finish

Style No.	Diam. of Wheel	Kind of Wheel	Wt. Per Set of 4
BW479-2	2"	Ruberex	2 Lbs. 4 Oz.
BW779-2	2"	Rockite	2 Lbs. 4 Oz.

Size Bore 9/16" x 1 1/2".

Packed one set in a box.

This Faultless Rigid Truck Caster is a desirable companion to the 400-Series. Made of extra heavy gauge steel, deeply corrugated to resist strain. Heavy axle, anchored to horn, is of large diameter, permitting smooth, easy rolling of the wheel. Ruberex, Ball Bearing wheel.

Green Lacquer Finish

Style No.	Diam. Wheel	Size Plate	Lbs. Cap. Each
522-3	3"	2 1/2" x 5"	100
522-4	4"	3 1/8" x 6 1/4"	175

Packed in bulk.

FAULTLESS DESK CUPS

Faultless Ruberex or Rockite Desk Cups are of nonbreakable, rust-proof composition, in a harmonizing brown shade.

Round Shape Desk Cups

Style No.		Wt. Per Set of 4
RDC	1 3/8"	5 Oz.
RDC	1 5/8"	7 Oz.

Square Shape Desk Cups

Style No.		Wt. Per Set of 4
SDC	1 1/2"	6 Oz.
SDC	1 3/4"	7 Oz.
SDC	2"	13 Oz.
SDC	2 5/8"	15 Oz.

Packed one set in a box.

This Faultless Ball Bearing Swivel Caster is a companion caster to the 700-Series Caster. Furnished with Ruberex (cushion tread) Roller Bearing wheel.

Green Lacquer Finish

Style No.	Diam. Wheel	Size Plate	Lbs. Cap. Each
323-5	5"	4" x 7"	350
323-8	8"	4" x 7"	400

Packed in bulk.

FAULTLESS CUSHION CHAIR GLIDES

Faultless quiet Cushion Chair Glides are mounted in live rubber. Steel reinforcing frame prevents nail pulling out. Base is of hardened steel, copper oxidized, impervious to wear. Furnished with Spring Clip Socket for square or round tubing, 7/8", 1" and 1 1/16". Approx. wt. per box, 5 oz.

Flexible Cushion Chair Glide

Style No.	Diameter of Base
NRS	7/8"
NRS	1 1/16"
NRS	1 1/4"
NRS	1 1/2"

Packed one set in a box.

Cushion Chair Glide Spring Clip Socket

Style No.	Diameter of Base
ORS	7/8"
ORS	1 1/16"

This Faultless Rigid Plate Caster is a companion caster to the 300-Series Faultless Swivel Plate Caster. The heights are identical with the 300-Series. It has a full drawn, formed, heavy gauge, steel horn. Furnished with Ruberex, Roller Bearing wheel.

Green Lacquer Finish

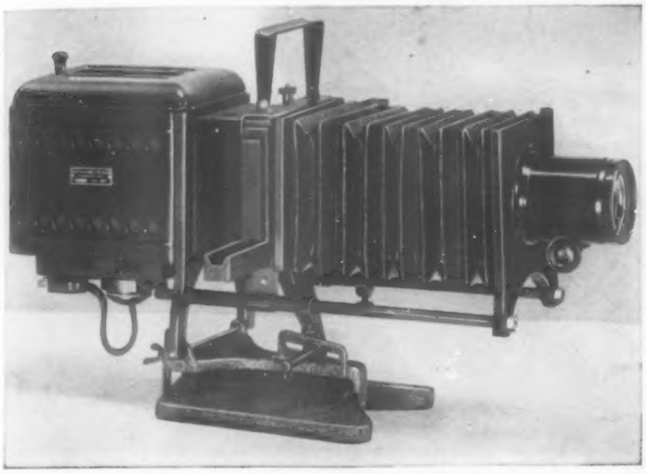
Style No.	Diam. Wheel	Size Plate	Lbs. Cap. Each
723-5	5"	4" x 4 3/4"	350
723-8	8"	5 1/16" x 6 3/16"	400

Packed in bulk.

BAUSCH & LOMB OPTICAL COMPANY

655 St. Paul Street, Rochester, N. Y.

New York — London, England — Chicago — Toronto, Canada — Boston — San Francisco — Los Angeles



BDT BALOPTICON—For Slides Only

This extremely popular model is inexpensive, sturdy in construction, compact, easily portable and highly efficient. Its optical system is of exceptionally high quality and (depending on the lamp and lens used) can be used at distances from 4 to 80 feet from the screen. Image sizes range up to as large as 10 feet on the longer side. Maximum illumination. Extremely simple to operate. Still film, micro-projector and overhead projector attachments are available. The sturdy, tilting base is adjustable in two meridians and permits leveling the Balopticon even when placed on an uneven surface. This mounting allows for changing the projection angle for screen at various heights.

Model B is the same instrument as the BDT but without the tilting base. It is recommended for use where a permanent installation is being made, although it is readily portable.

LRM AND ERM BALOPTICONS FOR OPAQUE OBJECTS AND LANTERN SLIDES

The new ERM and LRM Balopticons for lantern slides and opaque objects give brilliantly sharp screen images under actual classroom conditions. An improved Built-In Blower-Cooling System safeguards efficiently objects being projected. The improved object holder is entirely free from interfering obstructions and permits projection of 6" x 6⅛" areas of large maps, drawings or photographs. The door is arranged for convenience in placing solid objects in the projection area.

SEND FOR CATALOGS

Catalog E-11, "Balopticons and Accessories," completely describes our line of Balopticons, many of which were omitted here due to lack of space. Micro-Projectors for school and college use are the subjects for Catalog E-20. For informative on Bausch & Lomb Microscopes and Spectographs see page 391 of this book.

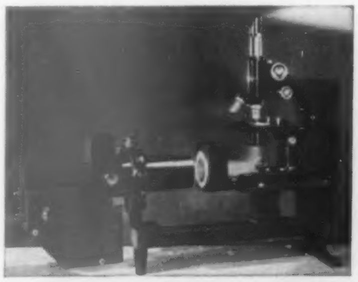
B&L 2" X 2" SLIDE PROJECTOR

Manufactured to the high standards of performance that characterize all Bausch & Lomb projection equipment, the performance of the B&L 2" x 2" Slide Projector is characterized by brilliant, crisp, sharply defined screen images plus comfort, safety and convenience in operation. Shows black and white or color transparencies. An ideal instrument for showing slides made by the instructor or by the students themselves.

This projector is substantially made and is fitted with a high efficiency Bausch & Lomb optical system. This consists of a 150 watt, single contact base bulb with a silvered, concave reflector, a triple lens condenser, one lens of which is special heat absorbing, and a five-inch *f*: 3.8 B&L Cinephor Projection Lens of the same type as used in professional motion picture projectors. Slide carrier permits use of cardboard, metal or glass mounted slides.

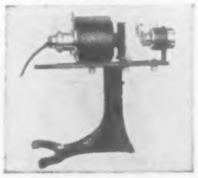
MODEL B MICRO-PROJECTOR

Now Bausch & Lomb offers a new Micro-Projector at a new low price. Any standard compound microscope can be used.



Simply place the microscope on the stage of the projector in an upright position, apply the prism reflector cap to the microscope and focus the illuminator. Complete directions accompany each projector.

Investigate this new instrument before completing your plans for science laboratory development.



TRIPLE-PURPOSE MICRO-PROJECTOR

Especially designed and priced for high schools, this extremely efficient unit serves three definite purposes—(1) projection of permanently mounted specimens on a screen from 4 to 15 feet away. (2) making drawings of microscopic fields. (3) projection of living specimens in liquids. Exceptionally sturdy in construction. Has both coarse and fine focusing adjustment. A two-power projection lens is included.

BALOPTICON TABLE

The B&L Balopticon Table provides a means of placing a Balopticon where it can be used to best advantage. It is portable (rollers on two front legs), and has a shelf underneath for slide boxes.

SPENCER LENS COMPANY

Buffalo, New York

Manufacturers of

Microscopes—Microtomes—Optical Measuring Instruments
Delineascopes—Photomicrographic Cameras

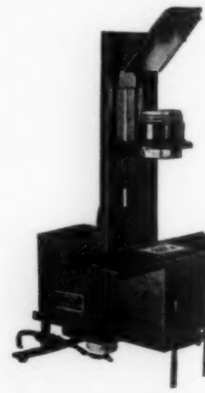
BRANCH OFFICES

New York . Chicago . Washington . Boston . San Francisco . Los Angeles . Dallas . Columbus . St. Louis . Philadelphia . Atlanta

COMBINATION CLASSROOM DELINEASCOPE

This Model VA Delineascope projects both lantern slides and opaque objects. It projects postcards, photographs, drawings, pages in books, mineral and biological specimens. The back of the instrument is open so that illustrations in books of large size may be projected. An improved elevating device facilitates centering the picture on the screen. Furnished with or without cooling fan. A filmslide attachment may be added.

Model V Delineascope is available for opaque projection only.



SCIENCE DELINEASCOPE

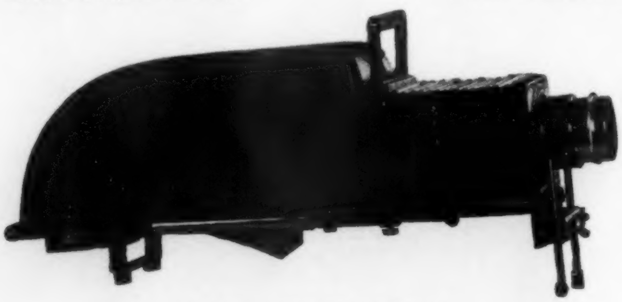
Spencer Model B is designed for lecture table use and projects glass slides, materials in Petrie Dishes or other transparent objects from a horizontal platform. Numerous scientific experiments such as magnetic lines of force, surface tension, mechanics, electrolysis, etc., can be effectively dramatized by projection to the entire class. This eliminates large, cumbersome and often expensive experiment set-ups.

The action of drawing or writing with a pencil on a ground glass slide can be projected. The shadow of any small pointer may be projected on the screen which is above and behind the lecturer.

DELINEASCOPE (for 2" x 2" slides)

Available as 300-watt, 200-watt, 150-watt or 100-watt instruments, this moderate priced MK group of Spencer Delineascopes is noted for an extraordinary brilliance of screen illumination. Film safety is assured by a well ventilated lamphouse and, in the more powerful models, by heat absorbing glass and a fan cooling unit.

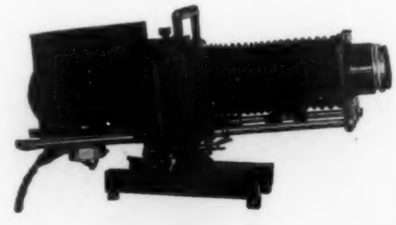
The MK-200 may be converted into a 300-watt model at any time by the addition of the fan cooling unit and a 300-watt bulb. The slide temperature in the 300-watt model is lower than in any other instrument of this type providing such brilliance of illumination.



NEW AUDITORIUM COLOR SLIDE DELINEASCOPE

Details and colors can now be brought to the projection screen in lifelike clarity and vividness with this new 750 watt Spencer Delineascope.

It accommodates both 2" x 2" and 3¼" x 4" slides and projects a more brilliant image either size than has formerly been obtainable with the average 1000 watt slide projector. An ingenious cooling system provides complete protection against film damage.



CLASSROOM DELINEASCOPE

Spencer Model D, for the projection of glass slides in classroom work, embodies several special features for the convenience of the teacher. It has a non-heat conducting carrying handle; a tilting and elevating device for conveniently locating the picture on the screen; an aperture in the side of the lamphouse to illuminate manuscripts; special optical system to insure remarkably sharp, brilliant pictures. Sturdy, lightweight and extremely portable.

FOR SPENCER MICROSCOPES SEE PAGE 392

WRITE DEPT. B13 FOR COMPLETE DETAILS ON SPENCER DELINEASCOPES

RCA Victor

MASTER CONTROL SOUND SYSTEMS

RCA Victor Master Control Radio-Sound Systems offer the principal or superintendent an efficient modern method of handling the ever increasing administrative duties of a school. Such systems not only make it easier to run the school, but also increase the efficiency of teaching throughout the school. In addition, they increase the effectiveness of instruction by enriching the curriculum.

An RCA Victor Master Control Sound System enables the principal or superintendent to make simultaneous announcements to any or all parts of the school building or grounds without leaving his office. It permits him to communicate with any or all teachers by merely throwing the proper switch and speaking into the microphone located either on his desk or in a separate control room connected with his office. Fire drills, first aid, emergencies, checking of attendance, health or general programs, controlled tests—all can be handled with a minimum of effort by a busy school executive.

In addition to communication facilities, the system also contains radio receiving and record playing equipment. The many educational radio programs broadcast today can be distributed to any room or rooms in the school as desired. Teachers can schedule specific records to be played during the day for correlation with many subjects in the school curriculum.

CLASSROOM INSTRUCTION

By Means of Radio and Phonograph:

- Musical Programs
- Social Science Programs
- Current Events
- Music Appreciation
- Foreign Language Study
- Special Programs
- Physical Education
- Speech Training

GENERAL SCHOOL ACTIVITIES

- Record (or Radio) Programs in Auditorium
- Music Programs by School Band, Orchestra, Records
- Background Music for Assembly
- Marching Records
- Records for Dancing Class
- Broadcasts of Significant Public Events
- Sound Effects for Plays

Speech Application

GENERAL ADMINISTRATIVE USE

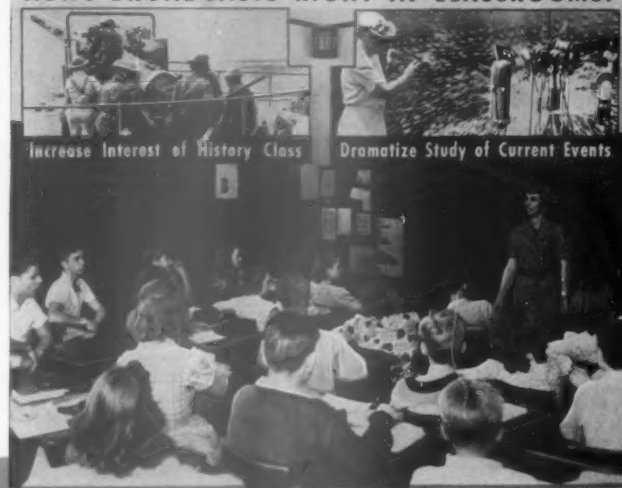
- Announcements
- Communication
- Emergencies
- Discipline
- Program System
- Increased Efficiency
- Student Training
- Controlled Testing

Safety Campaigns

EXTRA CURRICULAR ACTIVITIES

- Announcing Outdoor Athletic Events
- Exercises on School Grounds
- Commentary on Indoor Sport Events
- Stage Sound Effects
- Coaching of Dramatics
- Visiting Lecturers and Speakers
- P. T. A. Meetings
- School Dances and Socials

NEWS BROADCASTS RIGHT IN CLASSROOMS!



VOICE AMPLIFICATION IN YOUR AUDITORIUM
Means Increased Interest of Audience and Fewer Disciplinary Problems

DESCRIPTION OF ATHLETIC EVENTS HELD IN GYMNASIUM
Increases Spectator Interest and Attendance

RCA Victor

MASTER CONTROL SOUND SYSTEMS

RCA Victor Master Control Radio-Sound Systems offer the principal or superintendent an efficient modern method of handling the ever increasing administrative duties of a school. Such systems not only make it easier to run the school, but also increase the efficiency of teaching throughout the school. In addition, they increase the effectiveness of instruction by enriching the curriculum.

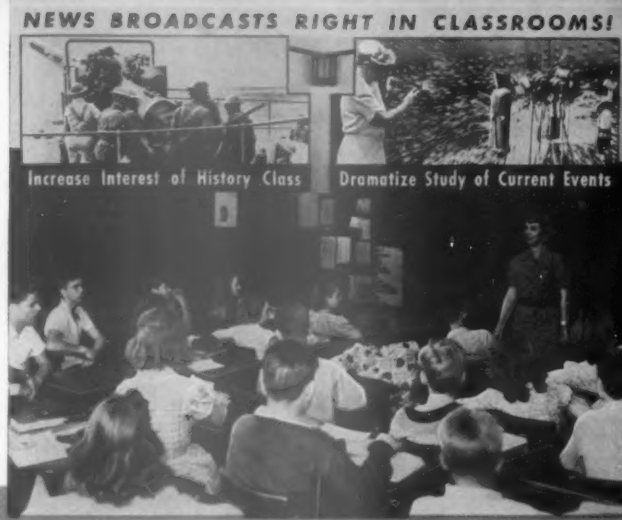
An RCA Victor Master Control Sound System enables the principal or superintendent to make simultaneous announcements to any or all parts of the school building or grounds without leaving his office. It permits him to communicate with any or all teachers by merely throwing the proper switch and speaking into the microphone located either on his desk or in a separate control room connected with his office. Fire drills, first aid, emergencies, checking of attendance, health or general programs, controlled tests—all can be handled with a minimum of effort by a busy school executive.

In addition to communication facilities, the system also contains radio receiving and record playing equipment. The many educational radio programs broadcast today can be distributed to any room or rooms in the school as desired. Teachers can schedule specific records to be played during the day for correlation with many subjects in the school curriculum.

CLASSROOM INSTRUCTION

By Means of Radio and Phonograph:

- Musical Programs
- Social Science Programs
- Current Events
- Music Appreciation
- Foreign Language Study
- Special Programs
- Physical Education
- Speech Training



GENERAL SCHOOL ACTIVITIES

- Record (or Radio) Programs in Auditorium
- Music Programs by School Band, Orchestra, Records
- Background Music for Assembly
- Marching Records
- Records for Dancing Class
- Broadcasts of Significant Public Events
- Sound Effects for Plays
- Speech Application

GENERAL ADMINISTRATIVE USE

- Announcements
- Communication
- Emergencies
- Discipline
- Program System
- Increased Efficiency
- Student Training
- Controlled Testing
- Safety Campaigns

EXTRA CURRICULAR ACTIVITIES

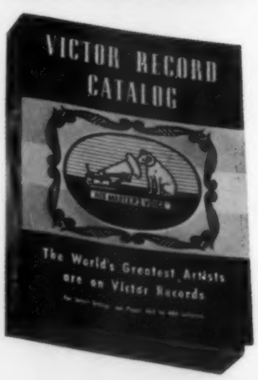
- Announcing Outdoor Athletic Events
- Exercises on School Grounds
- Commentary on Indoor Sport Events
- Stage Sound Effects
- Coaching of Dramatics
- Visiting Lecturers and Speakers
- P. T. A. Meetings
- School Dances and Socials

VICTOR RECORDS FOR SCHOOLS

Since 1911 VICTOR RECORDS have been prominent teaching aids in American classrooms. Close cooperation with schools has enabled the Educational Department of the RCA Manufacturing Company, Inc., to produce Victor Records which meet the requirements among schools for effective aids to the teaching of music, music appreciation, literature, English, speech, foreign languages, and many other subjects.

Today, in practically every subject from kindergarten through college, VICTOR RECORDS are being used to quicken interest and increase learning among millions of students. Included on these pages are many special catalogs, books, and folders designed to help you select the VICTOR RECORDS most suitable for use in your school.

The catalog, VICTOR RECORDS FOR ELEMENTARY SCHOOLS, contains a graded list of VICTOR RECORDS which have been recorded for use in the elementary grades. It is organized and indexed to provide the required information concerning hundreds of available records. It contains lists of recorded songs and stories for children, songs for rural schools, instrumental music, rhythm bands and orchestras, folk songs, and records for integration with many other subjects. It will be mailed from Camden to interested teachers and supervisors upon request.



The VICTOR RECORD CATALOG is a veritable encyclopedia of recorded music, and includes the outstanding works of all major composers recorded by the world's leading artists and musical organizations. It contains cross indexing and many special classifications which will be of the greatest assistance to teachers and students in high schools and colleges. It also contains much useful information concerning composers, artists, and musical groups. The catalog is available from the Victor Record Dealer from whom you purchase records.

MUSIC TEXT AND REFERENCE BOOKS •

These RCA Victor publications are used extensively in schools as text and reference books on music. They contain pertinent discussions of music and composers and are written in a language understandable by all who are interested in music.

VICTOR BOOK OF THE SYMPHONY $3.50
For all schools. An indispensable reference book containing descriptions of nearly three hundred orchestral works of all major composers.

WHAT WE HEAR IN MUSIC $2.25
For high schools and colleges. An authoritative text and reference book covering every phase of music, with analysis of all major compositions.

MUSIC AND ROMANCE $2.25
For junior and senior high schools. An unsurpassed text and reference book for student and teacher of music appreciation—1941 edition.

VICTOR BOOK OF THE OPERA $2.00
For all schools—contains stories of more than one hundred famous operas, profusely illustrated—now in its 10th edition.

MUSIC APPRECIATION FOR CHILDREN $1.25
For elementary schools. An outlined course to assist the teacher of music appreciation in grades one to six.

SPECIAL VICTOR RECORD BOOKLETS •

The booklet, VICTOR RECORDS FOR INTEGRATED UNITS OF LEARNING, lists the Victor Records suggested for use with the most important Units of Learning now commonly emphasized in elementary schools. The records suggested will be valuable in maintaining interest and will make a definite and vital contribution to the progress of the Unit.

Music teachers will welcome this summary of recorded MUSIC OF AMERICAN COMPOSERS for use in their music classes. It lists, alphabetically by composers, all Victor recordings of their most important compositions. It is a veritable "Who's Who" of American composers and their works.

RURAL UNITS I AND II has been prepared to fill the steady and growing demand for an organized series of recorded music for use in rural schools. It is an attractive, forty page booklet which contains simple instructions for the use of 26 selected Victor records for teaching music appreciation. More than 150 compositions are recorded on the 26 records.

Special emphasis placed upon Patriotism and Pan-Americanism in schools today will make this folder, PATRIOTIC AND FOLK MUSIC OF THE AMERICAS, most welcome. It lists a wide variety of recordings of patriotic music and dramatizations, ballads and folk songs, Indian and Negro music, and representative music of Latin-American Countries.

The art of folk dancing is enjoying a well deserved revival everywhere, especially in schools. This booklet, FOLK DANCING, SINGING GAMES, AND OLD FASHIONED DANCES, was prepared especially to provide a convenient listing of all Victor and Bluebird Records in these classifications. It should be most helpful to teachers in planning such activities.

Many choral directors have found it advantageous to use Victor Records to motivate their school choruses to a higher standard of performance. This folder, CHORAL MUSIC ON VICTOR RECORDS, has been prepared to help the choral director to select appropriate recorded material for such use. The records are listed alphabetically according to the organization which made the recording.

THE ABOVE BOOKLETS ARE FURNISHED WITHOUT CHARGE TO SCHOOL OFFICIALS AND TEACHERS

RCA Victor RECORDING EQUIPMENT

For Voice Training . . . Speech Correction . . . Public Speaking . . . Glee Clubs . . . Choral Work . . . Dramatic Presentations . . . School Bands and Orchestras . . . Special Events

Teachers and school executives have found that the use of recording equipment provides them with the most accurate and scientific means of determining and correcting speech defects—and measuring pupils' progress in speech and music instruction. Recorders are also invaluable for recording radio talks by prominent speakers, for the study and pronunciation of foreign languages, and for the recording of school plays, dramas, debates, and many other uses. Different models are available to meet special requirements.

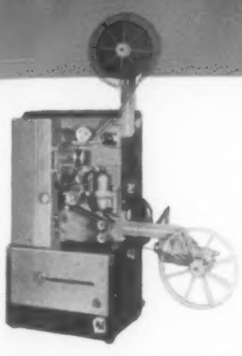
Recordings of students' speech at intervals, assist in measuring progress and correcting defects.

Recordings enable music students to hear their own performance as though they were sitting in the audience.

Foreign language structors make records for students to translate and study out of class.

Radio Guilds and dramatic clubs record their rehearsals to develop the best possible individual and group performance.

RCA 16 m.m. PROJECTOR



Designed by the same RCA Engineers who designed the RCA Photophone Sound Recording and Reproducing Equipment used by motion picture producers and in the majority of the world's motion picture theatres.

FEATURES

RCA Stabilized Sound—superior in life-like reproduction—with sufficient volume for practically all situations where 16mm. sound films are used. Variable Tone Controls assure the best reproduction of various types of sound input.

Brilliant Projection—using a specially designed optical system and larger (f.l.65) objective lens to provide greater illumination and more even distribution of light with 750 or 1000 watt lamp.

Simplified Threading—A threading line, east on the projection block, makes this sound projector as easy to thread as a silent projector. Large 16-tooth sprockets engage four to five holes at all times, avoid abrupt bends, and increase the life of film. The lower loop is adjustable while in operation.

Theatrical Framing—A special type of framing device does not move picture area on the screen and thus eliminates change of projector position while framing.

The film is kept in the center of most efficient projection light at all times.

Efficient Cooling—Specially designed blower scroll cools lamp, amplifier and aperture gate. Lamp house barely warm while in operation. Life of lamp increased. Lamp may be removed quickly and easily.

Operating Ease—All controls on the projector are conveniently located, grouped according to function to reduce possibility of error.

Easy Cleaning—of aperture gate, condenser lens system and reflector to provide maximum operating efficiency at all times.

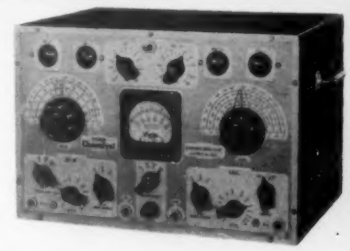
One Point Lubrication—Permanently lubricated journals throughout. One Point Lubrication of high speed parts.

Nation-wide Service—available everywhere to assure finest operation of projection equipment at all times.

CHECK
AND
MAIL
•
NO POSTAGE
REQUIRED

LABORATORY and TEST EQUIPMENT

THE RIDER CHANALYST



Of particular interest to schools is this new RCA instrument. It is designed to locate quickly the source of troubles in faulty radio receivers. It does this by tracing the signal from where it enters the radio receiver (the antenna) right through the set to the loudspeaker.

The Rider Chanalyst is particularly useful in explaining the operation of a radio receiver—for, in tracing the signal, which is visually indicated by the Chanalyst, the student is able to follow the course of the signal right through the receiver and thus better understand how a receiver works. Used in connection with an RCA Oscillograph, it enables the student to actually see the wave form of the various currents and, therefore, more clearly understand the circuits and their functions.

COMPLETE CATALOGS OF RCA LABORATORY EQUIPMENT AND PARTS

Due to space limitations only one of the many useful RCA instruments is mentioned here. Dozens of others are described in these two new catalogs which are available upon request. Write the Educational Department, RCA Manufacturing Co., Inc., Camden, N. J.

RADIO AND TELEVISION TEST EQUIPMENT
(Parts and Accessories)
RCA MEASURING EQUIPMENT

For further information

write to

EDUCATIONAL DEPARTMENT

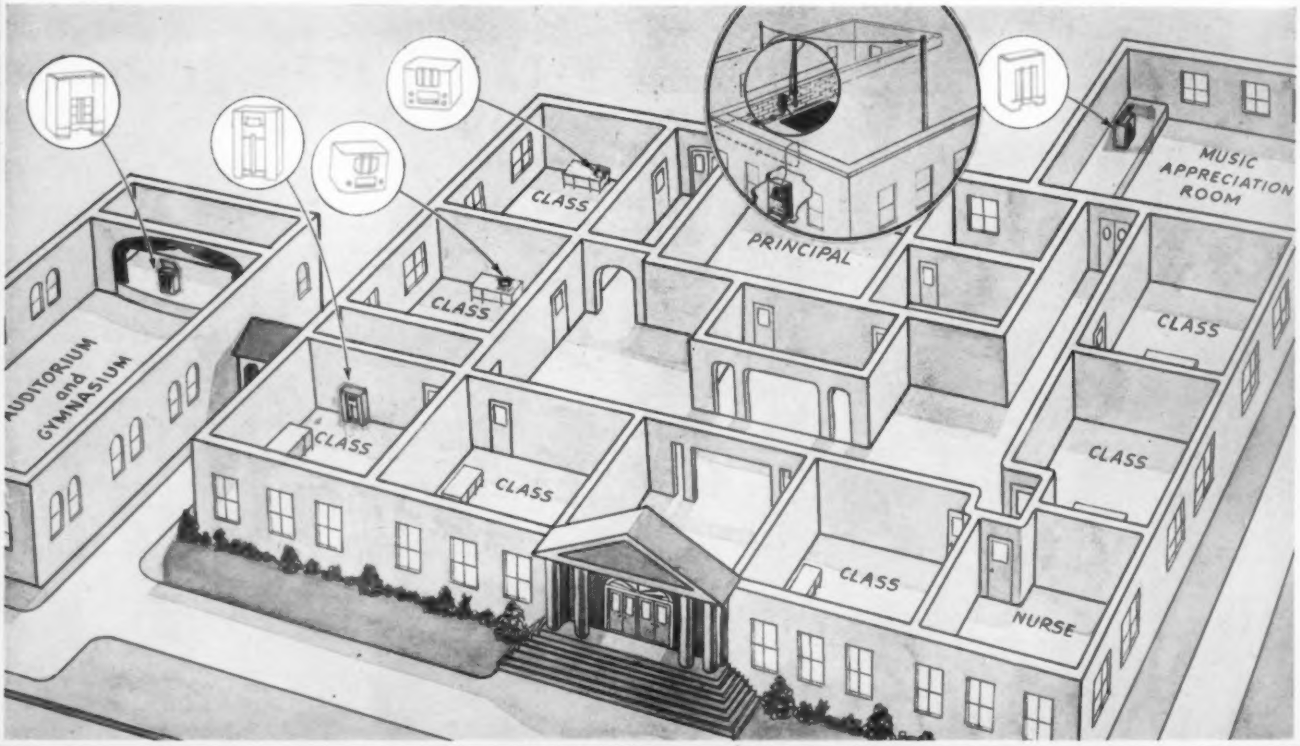
RCA MANUFACTURING CO., INC.
CAMDEN, N. J.

A RADIO-EQUIPPED SCHOOL IS A BETTER SCHOOL

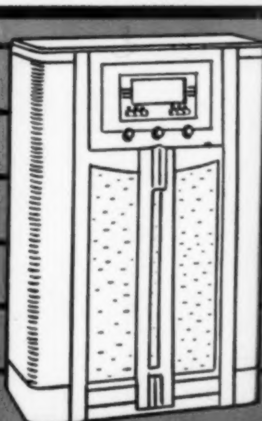
RCA Victor radio receivers and RCA Victrolas are designed to meet the radio and record playing requirements of any school. The sketch below illustrates one up-to-date method of equipping a school. Console radio-phonograph combinations are used in the Auditorium and Music Room, and table model radio receivers, with or without a phonograph, are used in the individual class rooms. Thus each classroom has available, at all times, individual equipment for playing records or receiving educational broadcasts.

Radios and Phonographs Aid in Teaching

MUSIC APPRECIATION	DANCING
SOCIAL SCIENCE	TYPEWRITING
CURRENT EVENTS	HISTORY
GYMNASTICS	VOICE TRAINING
DOMESTIC SCIENCE	LITERATURE
SPEECH AND DRAMA	FOREIGN LANGUAGES

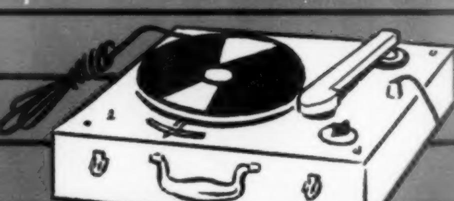


A typical radio-phonograph for classroom use. ▲



◀ A console radio receiver for high fidelity radio reception.

▼ A 33⅓ and 78 r.p.m. phonograph for playing 10-, 12-, or 16-inch records and transcriptions.



ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODERN SCHOOLS STAY MODERN WITH RCA TUBES IN THEIR SOUND EQUIPMENT

RCA Victor AUDIO VISUAL SERVICE FOR SCHOOLS

EDUCATIONAL DEPARTMENT

RCA Manufacturing Co., Inc., Camden, N. J. • A Service of the Radio Corporation of America • In Canada, RCA Victor Co., Ltd., Montreal

Form 1S4724

Printed in U.S.A.

WEBSTER ELECTRIC COMPANY

"Where Quality is a Responsibility and Fair Dealing an Obligation"

Racine, Wisconsin, U. S. A. Established 1909. Export Department:
100 Varick St., New York City. Cable Address: "ARLAB", New York City

TELETALK SYSTEMS *of Amplified Intercommunication*

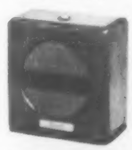
WEBSTER ELECTRIC Teletalk
REG. U.S. PAT. OFFICE

Licensed by Electrical Research Products, Inc., under U. S. Patents of American Telephone and Telegraph Company and Western Electric Company, Incorporated.

Teletalk provides instant 2-way natural voice communication between rooms, departments and buildings. Models such as the Master Unit illustrated at right are available to accommodate up to 24 stations in a system.

Stations may be called individually, or any selected group of stations (or all stations) may be called simultaneously—thus providing the facilities for public address and paging as well as intercommunication.

12-Station Master Teletalk Unit Model 212AM. Annunciators indicate when another station is calling.



Speaker-Microphone station 5A-45B with push button Annunciator signal.

Teletalk operates directly from the light circuit. Installation merely requires that interconnecting wires be provided between stations. Where all communications are from or to a single Master Station, the use of Speaker-Microphones for outlying locations gives efficient service at very moderate cost.

Master Units are available with Earphones or Handsets for confidential conversation, with Annunciators and other facilities to meet individual or special requirements. Catalog on request.

Larger Intercommunication Systems

Teletalk Amplified Intercommunication is also available for large schools, institutions, colleges and universities requiring systems of 30 stations up to 200 or more. A central or Master Station, usually located in the business or principal's office, can call any room or department and hold two-way conversation; or signals that come through the built-in Annunciator system notify when any outlying station wishes to talk.

Illustration shows Teletalk Master Station with facilities for communicating with 96 rooms. Earphone is used for confidential reception.

This equipment can be varied to meet any special communication requirements. Provisions for confidential conversation, paging, sound distribution and public address may be included.

Webster Electric Sound Systems

Webster Electric Sound Equipment is available to meet every school requirement from small classroom to large auditorium, amphitheatre and athletic stadium.

50-watt Portable or Fixed Sound System with Amplifier.

Systems are available in 5-, 10-, 12-, 20- and 50-watt power, with microphones, amplifiers, speakers and full equipment. Booster Power Stages are used where 100 or more watts are required.

Whatever you need in Sound Equipment is available through Webster Electric, with the Webster Electric guaranty of quality and performance. Sound Equipment Catalog on request.

Webster Electric Sound Distribution Systems

Facilities for sound distribution to any number of locations can be provided through Webster Electric Cabinet Type Amplifier Systems. Announcements, paging, and the distribution of speech, signals, recordings and radio programs—any or all of these can be transmitted through this equipment with natural tone quality.

Webster Electric Sound Distribution Systems are now in use in schools, colleges and universities from coast to coast. Consult your Classified Telephone Directory for the name of your nearest dealer or distributor, or write direct detailing your specific needs.

This cabinet type amplifier provides sound distribution for 60 rooms in several buildings of a great educational institution. Built into the panel are a phonograph pick-up and turntable, a 3-band radio, monitor speaker, and 60 3-position switches for intercommunication and sound distribution.

BELL & HOWELL COMPANY

1850 Larchmont Avenue, Chicago

NEW YORK HOLLYWOOD WASHINGTON, D. C. LONDON

Manufacturer of FILMO and FILMOSOUND
Educational, Professional, and Personal Motion Picture Equipment
Operator of Filmosound Library of Sound and Silent Films

Here's Film Service as Educators Want It!

● Bell & Howell Filmosound Library is constantly combing the world's sources for suitable school films to keep this finest film rental library always fresh, always growing even larger. It continually encourages capable producers to prepare new films to meet the current school needs that its perpetual research has revealed. It zealously guards its reputation for filling rental orders promptly, efficiently, and with prints that are in good condition.

But Filmosound Library is not content to stop with this fine service. For years this library has been making it ever easier for educators to *find* appropriate, effective films for any need—*with freedom from guesswork* and elimination of misunderstandings and disappointments.

The fruits of these efforts are the current editions of three film catalogs—one each on Educational, Religious, and Recreational films—plus an "Educational Film Utilization Digest." All four booklets have won educators' enthusiastic approval.

Get These Helpful Film Booklets!

Educational Film Utilization Digest. Cross - indexes 1187 films, quotes their rental and purchase or lease rates, and states type (sound or silent), length, age level rating, and subject matter area, as well as teachers' evaluation of each film as to technical quality and subject coverage. Includes references to catalog pages where objective film reviews may be consulted. Write for a free copy.

Educational, Religious, and Recreational Film Catalogs. Three separate booklets, each a rich source of films for the indicated use, each well organized for easy reference. Free to 16 mm. sound film projector users; 25¢ each to others. Write for copies, stating make and serial number of your sound film projector.

B & H Visual Equipment

PRECISION-BUILT BY THE MAKERS OF HOLLYWOOD'S PREFERRED STUDIO EQUIPMENT TO GIVE PROFESSIONAL RESULTS WITH AMATEUR EASE

16 mm. SOUND FILM PROJECTORS

Present both sound and silent films with theater-quality sound and picture reproduction. Easy to operate. Noted for lasting dependability in rigorous school service. Full range of models from compact Filmosounds (like the "Utility" model pictured) to the Filmoarc, which offers powerful arc illumination for the largest school auditorium and permits the use of safe, economical 16 mm. film for audiences otherwise considered too large.

FILMO SLIDE MASTER PROJECTOR

Brings new brilliance and sharpness to the projection of 2- x 2-inch transparencies, color or black-and-white. 1000-, 750-, or 500-watt lamp. 3½-, 5-, or 7½-inch lens. Precision construction.

16 mm. SILENT FILM PROJECTORS

Models for classroom, auditorium, or combination use; all providing superior projection, easy operation, complete protection from film damage, with the sturdy B&H construction which gives years of trouble-free service.

Quality Accessories—Extend the scope of your sound film projector with a B&H Disc Recorder and Record Player, or a Phonograph Transcription Turntable. Use a B&H Microphone for commentaries through Filmosound amplifier and speaker.

DA-LITE SCREEN CO., INC.

Dept. 42 A. U., 2711 North Crawford Ave., Chicago, Illinois

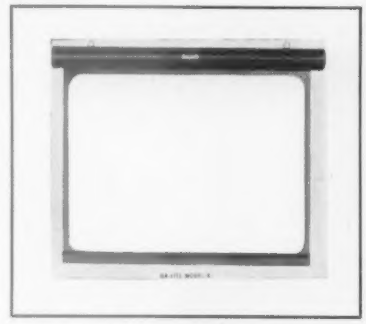
Scene from "Yesterday, Today, and Tomorrow," motion picture film of H. J. Heinz Company, as shown on the Da-Lite Challenger

Reg. U. S. Pat. Off.

SCREENS

Famous For Quality

For 33 Years

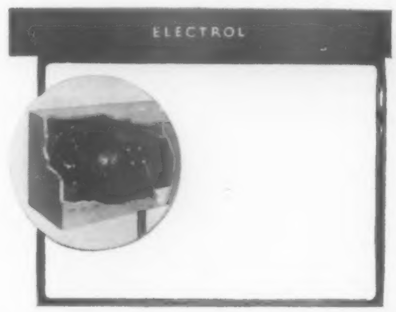


DA-LITE MODEL B

is a high-quality, low-cost hanging screen with Da-Lite's Glass-Beaded fabric, spring roller-mounted in a protective case.

DA-LITE CHALLENGER SCREEN

This convenient model can be set up instantly anywhere, yet folds compactly for easy carrying—a definite advantage where the screen must be used in several classrooms. The Challenger, with its square tubing in both center rod of tripod and extension support, simple adjustment of height, famous Da-Lite glass-beaded surface, and other superior features, is first choice of leading schools and universities and prominent users of industrial films, such as General Mills, Inc., Perfect Circle Co., Deere & Co., and Great Northern Railway Co. It is durably built to give many extra years of trouble-free service. 12 sizes from 30″ by 40″ to 70″ by 94″.

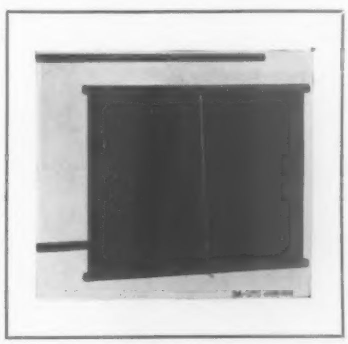


DA-LITE ELECTROL HANGING SCREEN

For auditoriums and large classrooms, the electrically operated ELECTROL offers utmost convenience and long life. It is the only truly *automatic* screen ever built for non-theatrical showings. Screen fabric, roller mounting, motor and gear drive are housed in one compact unit which can be quickly installed. The screen is unrolled and rerolled by *electrical* control. Sizes up to 20 ft. by 20 ft.

DA-LITE REPLACEMENT FABRICS

If your screen surfaces have become soiled or damaged, ask about replacing them with Da-Lite Glass-Beaded, white or silver surfaced fabrics! On Da-Lite Screens there is no additional labor charge for mounting. Da-Lite fabrics are available for all standard sizes of screens. Special sizes quoted on request.



DA-LITE JUNIOR SCREEN

For small groups, this table model is practical and economical. It has Da-Lite's finest glass-beaded surface.

Free. Send for Da-Lite's 40-page data book on screens, describing these and other models and containing valuable information on the selection and care of all types of projection screens. Write for your free copy now.

GENERAL ELECTRIC COMPANY

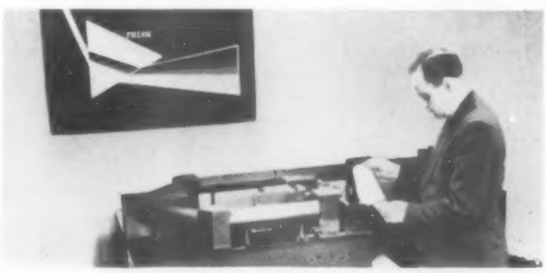
Schenectady, New York

Educational Motion Pictures

The General Electric Company is glad to lend any of its 45 motion pictures to schools, colleges, or other organized groups. Films for distribution in the United States are lent free, except for a small shipping charge. Ask for the new catalog, GES-402G, by writing to the Visual Instruction Section, Publicity Department, General Electric Company, Schenectady, N. Y., or to the nearest G-E office.

The new films listed below are particularly recommended:

CURVES OF COLOR No. S-2451

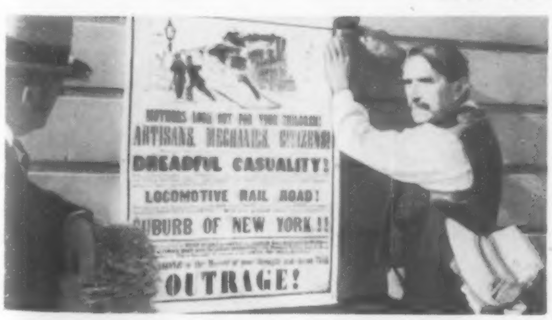


A beautiful, all-color story of the "recording photoelectric spectrophotometer," which can distinguish over two million shades of color and then draw a "curve" of each color. The film runs ten minutes and is available in 16-mm size only.

EXPLORING WITH X RAYS No. S-2464

A 40-minute story of X rays from the time of their discovery by Roentgen to the most modern, up-to-date applications of the famous Coolidge tube. The film shows how X rays have become vital to the medical profession and to industry. Dr. Coolidge, himself, tells what X rays are and how they are produced.

RAILROADIN' No. S-2466

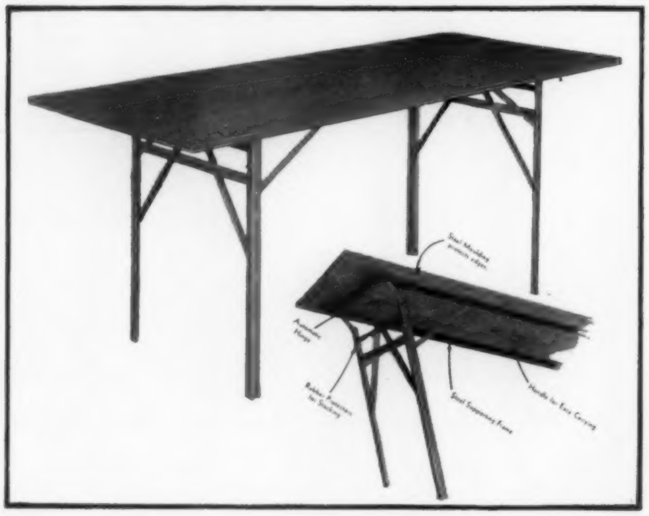


Stirringly portrayed, this 30-minute production shows many scenes from the colorful history of the railroad industry. The whole story is vividly shown in full color—from the days of early opposition, through the role of the railroads in pioneering the great West, to the fast, luxurious trains of today.

THE BREWER-TITCHENER CORPORATION

118 Port Watson St.
Cortland, New York

Hostess FOLDING PRODUCTS



FOLDING BANQUET TABLES

The construction feature of an all-steel frame (Note illustration) gives exceptional lightness with superior strength and rigidity. Frame and legs are of 1 x 1 x $\frac{7}{64}''$ high carbon angle steel. The legs are finished in buff, and the frame black enamel.

One man can quickly set them up or knock them down by a simple swing of the legs. The legs operate in units of two. Automatic locking device with positive catch requires no manipulation.

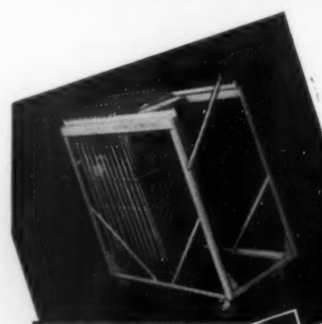
The tops are regularly furnished with beautifully grained ply panel, finished with two coats of heat and stain resisting hot-spray lacquer. All tops are oil dipped to resist warpage, and all edges are protected with an attractive steel moulding around the entire top.

Obtainable in various sizes including the rounds; also with tempered masonite and linoleum tops.

Stacks 6 to 19½ Inches

ALL METAL FOLDING CHAIRS

DELUXE FOLDING CHAIRS



THE VERTICAL TRUCK. Allows one man to move twenty-four chairs with ease. Obtainable in colors to match chairs.

THE HORIZONTAL TRUCK. For under stage auditorium use. Carries 36 chairs. Special trucks built to specification.

Hostess DeLuxe chairs depart entirely from old time construction principles. Here is a full back and full seat all-steel, all-riveted folding chair, upholstered both back and seat. When folded, the upholstering is between two protecting metal parts that form back and seat, thus eliminating danger of damage to upholstery during storage. Hostess DeLuxe chairs are obtainable in many color combinations and all metal parts are finished in beautiful metallic colors. All chairs are equipped with large pure rubber feet.

J. R. CLANCY, INC.

Syracuse, New York

DESIGNERS AND BUILDERS OF COMPLETE STAGES

The stage of the New Central Theatre at Passaic, New Jersey John and Drew Eberson, Architects

•

An outstanding example of correct theatre construction that can be readily adapted to the needs of any school or university

MODERN construction of school and university auditoriums demands a stage that is "professional" in its characteristics—a stage where school dramatics can be produced effectively; where sound pictures can be shown to advantage; where lectures and concerts can be suitably staged. The "professional" stage illustrated provides a most practical solution to many problems.

The valance and proscenium draw curtains lend charm and atmosphere to the proscenium while the grand drape, tormentors and main act curtains furnish a background for lectures, speakers and soloists as well as proper masking for the picture screen and sound horns. The ceiling borders supply masking overhead and for the border lights, the proper spacing of which is very important and requires careful calculation.

Side legs eliminate the unsightly draw curtains so often used on school stages and provide side entrances at many points. They also permit cross-lighting, proper ventilation and a clear view of the complete stage for directors, stage-hands and switchboard operators. Mid-stage curtains allow the stage to be "cut down to size" and the cyclorama formation assures proper background.

Complete in scope, flexible in operation and suitable for all types of stage work, the "professional" stage when properly designed and equipped is most economical, additional equipment is not required and replacements are minimized.

Although not essentially school stage equipment, the Band Wagon is frequently used where musical presentations are important. The illustrated Band Wagon is electrically operated, moves quietly even with the added weight of the band and their instruments, and does not mar the finest floor. Built in sections, it can be adjusted in size or dismantled for storage. It is also furnished for hand operation.

To design a professional stage requires a thorough knowledge of structural requirements, the proper spacing and location of curtains, picture screen, sound horns, border lights, ceiling borders, side legs and the proper type and size of mechanical equipment. In fact every minute detail must be known so that each unit may be fitted in place and easily handled with utmost safety.

The executive and engineering staffs of J. R. Clancy, Inc., the leaders in modern stage construction, are available for cooperation on any problems involving the building of new stages or the remodelling of older structures—a distinctive Clancy service. Before plans are completed, suggest to your architect that Clancy cooperation may be had without added cost. Just send a complete story of your problem or ask for the Clancy stage questionnaire. Clancy can make your stage a complete success.

SUGGESTION TO SCHOOL EXECUTIVES

There are many worthwhile stage productions, concerts, lectures, and other attractions which might be handled to the profit of school organizations if your school has a properly equipped "professional" stage. Your school and your community will appreciate and enjoy the benefits of a Clancy built "professional" stage

Originators and Manufacturers of "KLIEGLIGHTS"

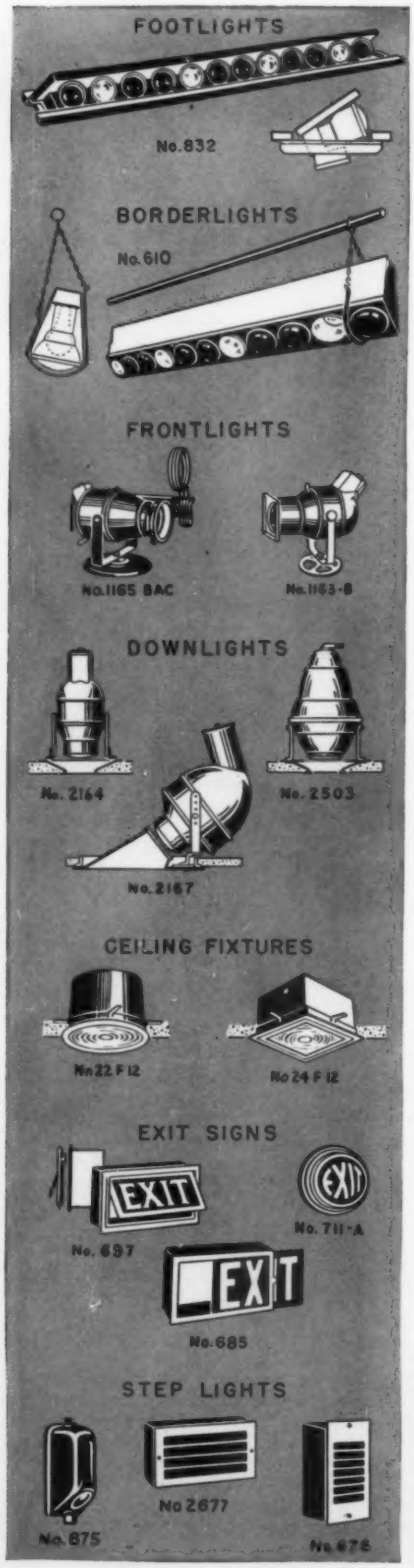
KLIEGL BROS.

UNIVERSAL ELECTRIC STAGE LIGHTING CO., INC.

EST. 1896

STAGE and AUDITORIUM LIGHTING

321 West 50th Street, New York, N. Y. Tel. COlumbus 5-0130



WHATEVER your requirements may be, in the nature of lighting equipment, we can probably supply your needs. As leading manufacturers in the field of theatrical and specialty lighting, we produce a varied and complete line of fixtures, apparatus, and accessories.

PRODUCTS

Stage lighting equipment of every conceivable form—including permanent and portable types; color lighting accessories, stage effects, repair parts, and supplies.

General and architectural lighting equipment—such as: inbuilt fixtures, cove strips, exit signs, aisle and step lights, black-out lights, outdoor floodlights, etc.

Special lighting devices for unusual needs or exceptional conditions—made to exact requirements.

SERVICES

Adequate facilities and an experienced staff assure satisfactory fulfillment of our commitments.

Our engineers are available for consultation in preparation of layouts, selection of equipment, or development of units for special needs.

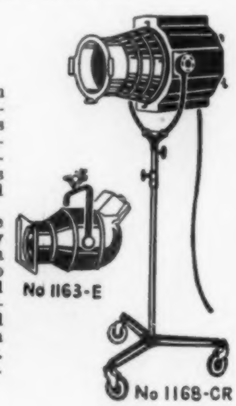
INQUIRIES

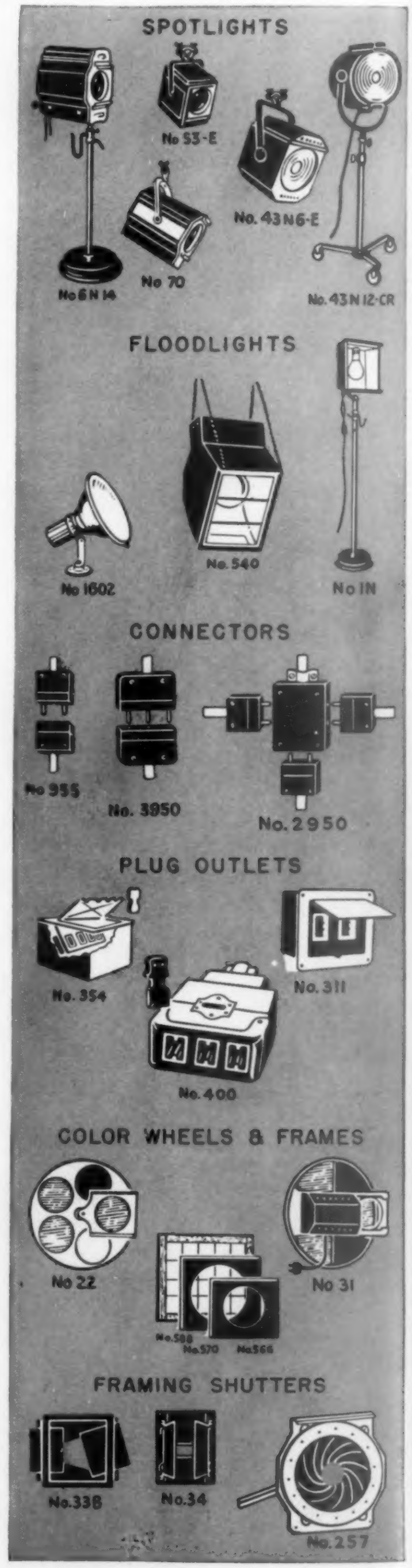
Your inquiries are invited. Bulletins giving information regarding our products, drawings for planning installations, or other particulars, are furnished on request.

KLIEGLIGHTS

High intensity beam projectors with ellipsoidal reflectors, lens system, and coordinated shutter arrangement which permits regulation of size and shape of light beam.

Portable units have an in-built four-way shutter system, with external controls to facilitate quick and easy adjustments. Permanently installed units have a drop-in shutter arrangement. Full particulars on request.





MORK-GREEN STUDIOS

Creators of

Distinctive Stage Equipment

243 W. Congress Street
DETROIT, MICHIGAN

1126 Chimes Building
SYRACUSE, NEW YORK

Stage Settings by Mork-Green

Mork-Green stage settings, in harmonizing, interesting designs. serve as a frame for performances, magnifying the best efforts of the teachers and the pupils.

Whether you use the school stage for a student speaker or for a play with a big cast, your students are at their best with a background of Mork-Green draperies.

Our stage settings help bring out the latent talent of the students, increase their interest, and make for a keener competition among them in their efforts to present outstanding entertainment, as well as first-class productions of a more serious nature.

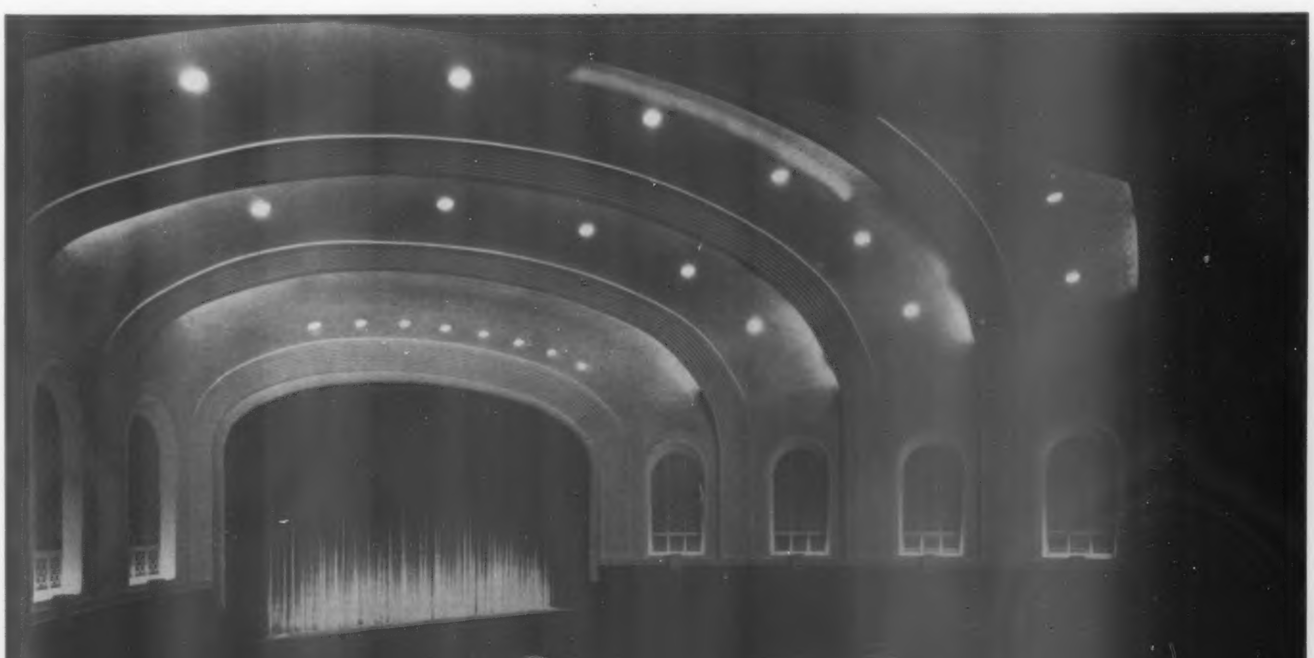
VELOUR CURTAINS
CURTAIN TRACKS
CURTAIN CONTROLS
PAINTED EXTERIORS
CYCLORAMAS
AUDITORIUM DRAPES
ELECTRICAL EQUIPMENT
STAGE HARDWARE
PICTURE SCREENS
SCENERY FOR RENT
RIGGING

Mork-Green Experience

Mr. R. J. Mork's thirty years of experience exclusively devoted to the planning and manufacturing of stage equipment for schools and theaters, makes available to you a service unsurpassed anywhere. You are invited to take advantage of it.

Mr. T. S. Green, our New York representative, has had many years' experience in this line of work. Most of the remarkably attractive school stage installations in his territory were made under his direction, by Mork-Green Studios.

Mr. H. G. Carlson heads our mechanical department. The satisfactory operation of all Mork-Green stage equipment is assured through his supervision.



The stage of the Hall of Music in Indiana University's new million-dollar auditorium, designed to accommodate productions as large as those of the Metropolitan Opera Company and regarded by experts as one of the most modernly equipped in the United States, is a Mork-Green installation

AUTOMATIC DEVICES COMPANY

1037 Linden Street, Allentown, Pa.

EXPORT DEPARTMENT—220 W. 42nd Street, NEW YORK, N. Y., U. S. A.

DIRECT FACTORY REPRESENTATIVES

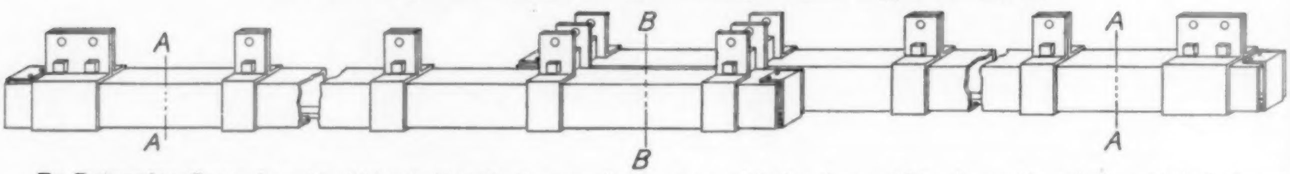
CHICAGO, ILL., N. C. Nussbaumer, 1050 N. Humphrey Avenue, Oak Park, Ill. ST. LOUIS, MO., A. M. Pollack, 1310 Midland Drive

PRODUCTS

"Silent-Steel" Heavy Duty Curtain Track.
"Besteel" Medium Duty Curtain Track.
"Steelite" Light Duty Curtain Track.
"Aerial" Type Unit-Combination Track and Machine: ⅓ hp.
"Silver Service" High Speed Curtain Machine: ½ hp.
"Autodrape" Standard Curtain Machine: ⅓ hp.
"Autodrape" Special Curtain Machine: ¼ hp.
"Stabilarc" Motor-Generator for Projection Arc Supply.

CURTAIN TRACKS

Turnbuckles, Pipe-Batten Hangers, Wall or Ceiling Brackets Supplied as Desired

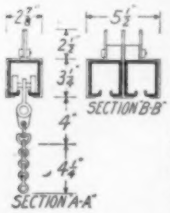


To Determine Gross Length of Track Required—As a basis, start with the clear width of opening which curtain is to uncover; i.e., distance between inside edges of curtain halves when in open position. Add 10% for lap at center for curtain when closed. Add 10% for extension on each end to accommodate each half of curtain when in open position. Total addition is 30%.

Example: Open curtain is to expose 30 ft. clear width. Add total of 30% or 9 ft. for center lap and both end extensions. Specify 39 ft. gross length, in two sections each 19 ft. 6 in.

"SILENT-STEEL" HEAVY DUTY CURTAIN TRACKS

For Any Length—with Curtain of Any Weight



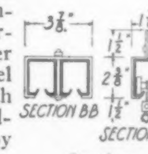
Section Dimensions

Suggested Specifications—Curtain tracks shall be of full-steel construction, 14-gauge, entirely enclosed, except for slot in bottom, each half to be one continuous piece and free of any riveted, welded or other mechanical joints regardless of length, except at center lap. Each curtain carrier shall be supported on ball bearings by two special composition rubber wheels rolling on two separate parallel treads, and all pulley blocks equipped with steel ball bearing wheels adequately guarded; Model No. 280 as manufactured by **Automatic Devices Company** of Allentown, Pa.

"BESTEEL" MEDIUM DUTY CURTAIN TRACKS

For Lengths up to 36 Ft.—with Light or Medium Weight Curtains

Suggested Specifications—Curtain tracks shall be of full-steel construction, 14-gauge, entirely enclosed, except for slot in bottom, each half to be one continuous piece and free of any riveted, welded or other mechanical joints regardless of length, except at center lap. Each curtain carrier shall be of cadmium-plated steel construction supported on self-lubricating bearings by two special composition rubber wheels rolling on two separate parallel treads, and all pulley blocks equipped with steel, ball-bearing wheels adequately guarded; Model No. 170 as manufactured by **Automatic Devices Company** of Allentown, Pa.



Section Dimensions

AUTOMATIC CURTAIN MACHINES

"Autodrape" Curtain Machines

All "Autodrape" machines are equipped with exactly the same gear reduction unit, base and automatic reversing switch mechanism, including the following features:

(1) Limit Switch Arrangement—Adjustment for "open" and "close" positions reduced to simplest form.

(2) Elevator Type Traction Drive—Maximum delivered power without slippage.

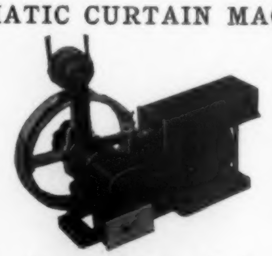
(3) Mounting—Endless cable design allows installation of machine at any position in vertical plane of track.

(4) Disconnecting Clutch—For conversion to hand operation.

(5) Automatic Overload Protective Breaker—Protects machine against excessive loads.

(6) Motor—¼ or ⅓ hp., single phase.

(7) Speed—92 or 115 ft. per minute, equivalent to curtain separation of 2¾ or 3½ ft. per second, respectively (based on 60-cycle current).



"Autodrape" Standard Model

Over-all dimensions: 19½ in. long, 10 in. wide, 15½ in. high

"Autodrape" Special Models—These models have features listed at left and are the lowest priced fully automatic machines on the market; ¼ hp.

Recommended for use with "Silent-Steel" or "Besteel" Tracks up to about 36 ft. gross length.

"Autodrape" Standard Models—In addition to the features listed at left these models include idler system and finger-tip control switch attached to machine; ⅓ hp.

Recommended for use with "Silent-Steel" Curtain Tracks up to about 50 ft. gross length.

"Silver Service" Curtain Machine

This model has all the features of the "Autodrape" Standard Machine. It is equipped with ½-hp. motor delivering a cable speed of 125 or 155 ft. per minute equivalent to curtain separation of 4 or 5 ft. per second.

Recommended for use with "Silent-Steel" tracks up to about 80 ft. gross length.

REPRESENTATIVE INSTALLATIONS

Public Schools
New York, N. Y.
Philadelphia, Pa.
Baltimore, Md.
Cleveland, Ohio
Washington, D. C.
Newark, N. J.
Buffalo, N. Y.
Seattle, Wash.
Providence, R. I.
Pittsburgh, Pa.
Sacramento, Cal.

Theatre Circuits
Paramount-Publix
Warner Bros.
Balaban & Katz
R-K-O
Loews
Fox
Wilmer & Vincent
Comerford

Hotels
Waldorf-Astoria and Park Plaza, New York
Miami-Biltmore, Miami
Palmer House and Stevens Hotels, Chicago
Mayflower, Washington

Industrial Exhibits
General Motors Co.
Sears, Roebuck and Co.
Ford Motor Co.
General Electric Co.

U. S. Government
Army Posts
Naval Stations
Veterans' Hospitals
Department Bldgs., Washington, D. C.
Public Health Hospitals
Resettlement Projects
Housing Administration

Colleges
University of Chicago
U. S. Military Academy
Swarthmore
University of Maine
New York University
City of New York
Connecticut College
Georgetown University
Drexel Institute

Miscellaneous
Radio Stations
Municipal Auditoriums
Masonic Lodges
Y. M. C. A.
Churches
Clubs
Art Museums

For Complete Information and Samples of Track write to Automatic Devices Company, Allentown, Pa.

SECTION VIII
BUSINESS EDUCATION—ADMINISTRATIVE OFFICE

LAYOUT AND EQUIPMENT OF A UNIVERSITY BUSINESS OFFICE ENLARGED TO MEET NEW NEEDS

By RAYMOND C. MAGRATH

Treasurer, University of New Hampshire

WHEN the writer joined the business office staff of the New Hampshire College of Agriculture and the Mechanic Arts in 1920, he became the fifth occupant of office quarters in the administration building which appeared to be adequate for any expansion that might be necessary far into the future. Student registration had then reached 800; an acute shortage of classroom and dormitory facilities existed; summer school was not to come into being for another two years; student loan funds were in their infancy; the increased appropriations making possible larger usefulness of the extension service and an extended research program in the agricultural experiment station were not to be realized for another half-decade; purchasing procedure lacked effective control; and bookkeeping and other records were penmanship products.

Expansion

In rather rapid succession, college enrolment increased by leaps and bounds; the college by legislative sanction became the University of New Hampshire; a millage tax law of one mill on each dollar of assessed valuation was enacted to provide funds for adequate maintenance and much-needed building expansion; Federal appropriations for University maintenance, the Extension Service and the Agricultural Experiment Station were supplemented by additional grants; and student loans increased to small banking proportions. The business office staff during these years had an additional appointee only when the load became an impossible burden for the existing personnel. Desks were gradually packed so closely together that efficiency suffered. A common cold meant either ostracism of the offender or the sharing of the distemper by all. However, accounting machines and other labor-saving devices had been installed as conditions warranted, so that when larger quarters became a reality the equipment requirements did not present too serious a problem.

Adjusting Space to Meet Needs

In 1938 the Home Economics Department moved to a new building and vacated a sewing and handicraft laboratory, a classroom, an office made by stretching a temporary partition across the main corridor, a staff office adjoining the classroom, and a cooking laboratory in the basement.

Plan A shows the former business office, occupying one of the front tower corners of the administration building, Thompson Hall, and the space on the same floor vacated by home economics and allotted to the business office. Our problem called for the conversion of this space into functional areas to facilitate the handling of University business from the points of view of effective office management and the convenience of the student body, faculty, and general public.

Plan B presents the necessary structural changes in the remodeling of the quarters for business office purposes.

How to allow the maximum amount of daylight to sift into the main corridor of the administration building was solved by the arrangement of the cashier's window shown in the photograph and by glass-paneled doors leading from the corridor to the business office lobby.

Acoustic treatment of all ceilings was projected, and linoleum was laid on all floors. Venetian blinds have been installed where their need seemed greatest.

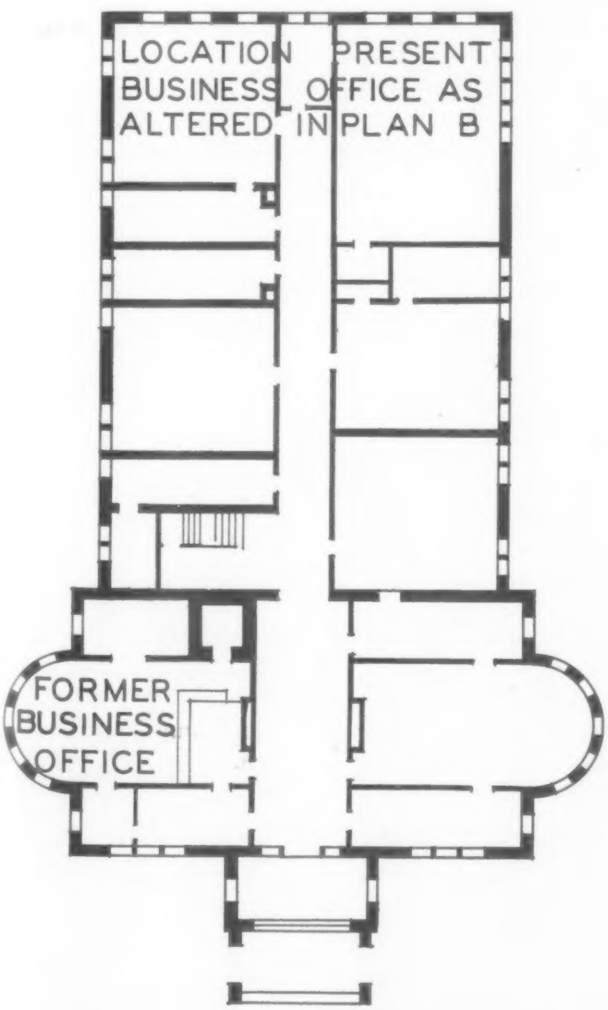
As one enters the business office lobby, his attention is directed first to the cashier and the service windows of the purchasing division on the left, and the accounting and student aid sections on the right.

The Cashier's Work and Equipment

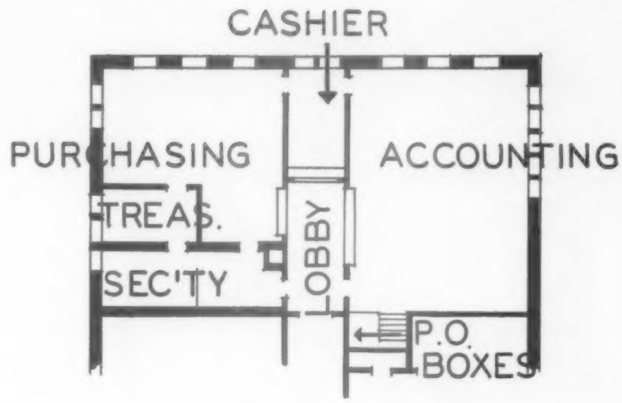
The cashier's equipment consists of a cash register which records on a duplicate receipt the amount received, the date, and the transaction number, the original receipt being given to the customer and the duplicate retained for accounting records. The register carries several totalizers for daily cash receipts, bank deposits, and other internal details. A grand total accumulates all income for the fiscal year. An adding machine and a typewriter are essential tools, as are also card and record files that fit into a fireproof safe when not in use. The cashier handles the disbursement of student and general labor payrolls, the collection of student semester fees, student deposits of personal funds for safekeeping, and other duties that are peculiar to this phase of an educational institution.

The Treasurer's Secretary at Work

A glance at Plan B will indicate the location of the treasurer's secretary. It is her function to receive



PLAN A



PLAN B

visitors, answer as many routine questions as practicable and direct inquiries to the division charged with specific responsibilities, thus relieving the treasurer of as much detail as is consistent with the rendering of maximum service courteously and expeditiously. It is perhaps trite to suggest that a competent secretary can make a most valuable and time-saving contribution in the effective dispatch of innumerable details that would otherwise require time-consuming effort and energy on the part of an administrator.

Post-office lock boxes (Plan B) opening from the corridor serve the office occupants of the building. From inside the business office, mail is sorted into the boxes by both the U. S. postman and the campus mailman.

The treasurer's secretary receives all mail for the business office and also that which is addressed to the University without specific departmental direction, and distributes or redirects it to the proper offices. Mail is stamped with the receiving date for such reference as may be necessary in the future.

The secretary's desk, in common with all other desks where typewriting is done extensively, is of the pedestal type. The top of the desk thus affords maximum working surface.

Files are maintained under the conventional alphabetical subject-matter plan. A set of file drawers is reserved for special items to be carried forward from one year to the next—studies, reports, and data to which more or less frequent reference is made constantly.

Dictating and Transcribing Equipment

A most important piece of equipment is the transcribing unit, whose companion, the dictating unit, is the keystone of the treasurer's job. How many years dictating equipment has been part and parcel of the basic machinery of the business office is of little consequence in comparison with the use made of it every day of the year, and anticipation of its con-

tinuance far into the future, or until inventive genius perfects a better method. Perhaps the writer can be pardoned for his enthusiasm for this tool of business that becomes increasingly important in the speedy dispatch of his duties. How antiquated shorthand dictation and transcription appear when occasionally a brief note is dictated! It is much simpler to tell it to an impersonal machine that will not in the slightest manner disturb one's thinking processes, no matter how cumbersome, and yet record the spoken word with unerring accuracy and faithfulness for transcription at the convenience of the operator of the companion piece, the transcribing unit. No notes to get "cold," and—of greatest import—one may dictate at odd moments when inspiration exerts its influence, or freedom from distraction and interruption allows speech to flow more freely and accomplishment seem greater. Dictating and transcribing equipment is in service in the purchasing and accounting departments, and perhaps has its most effective application in the student loan program, where correspondence is essentially the backbone of such a system.

Entrance to the treasurer's office is gained from either the secretary's or the purchasing agent's offices. The treasurer's principal equipment consists of a dictating unit, the necessary chairs for conference and committee duties, a bookshelf unit for reports, publications, and reference material, and a ledger of investments arranged for visible indexing.

The Purchasing Office

The purchasing office has grilled windows facing the lobby, where routine questions may be asked and answered with a minimum of time and effort. The purchasing agent is responsible for the receipt of all requisitions and the placing of orders, proof of accuracy of vendors' invoices, and verification of the receipt of goods. A small calculating machine facilitates the checking of invoice extensions. His office must maintain a library of catalogs for reference not only by his staff but by department heads and faculty members. Across his desk he confers with the many salesmen whose wares enter into the thousands of articles an educational institution must purchase to satisfy teaching in agriculture, the arts, engineering, research, extension work, and the maintenance of the physical plant. His records include visible index binders where price and quantity information is maintained for reference in the placing of future orders. Variations in prices paid are important where limited budgets make it incumbent upon the purchasing agent to procure the greatest value from every dollar expended.

Purchase orders are typewritten on a fanfold form using a simple typewriter attachment—the original to the vendor, the duplicate remaining in the office, and the triplicate to the department requisitioning materials. The triplicate is used in the departments mainly for the purpose of checking receipt of goods from the vendor. Dictating equipment has been mentioned previously as essential for most effective operation.

The staff of four—purchasing agent, stenographer, invoice clerk, and clerical assistant—compose the purchasing division which, incidentally, is as large as the entire business office staff of twenty years ago, and is an indication of the growth of the institution as well as the need for more efficient purchasing technique. Student assistants supplement this staff during the college year and likewise during the vacation period in the summer.

The Accounting Office

The layout of the accounting office (Plan B) brought into consideration the general accounting of the University and student aid requirements with windows for approach to each of these services facing the lobby.

Bookkeeping machines have constituted standard equipment in the business office for a relatively long period of time. The present equipment consists of two automatic totaling machines for accounting and one such machine for billing. Accounting records are kept in trays such as noted in the photograph. Trays in turn are moved on rubber-wheeled stands or carriages. It should be noted that the trays when on the stands are designed for the correct working height for operation at the bookkeeping machines. Likewise, the shelves in the safes are planned to receive the trays at the same levels as the stands or carriages, thus assuring a minimum of effort in transferring the trays from the safe to the stands or vice versa. Trays, when not in use, are housed in office safes properly protected from overnight fire hazards. The photograph shows one tray rolled into the safe, another in process, and a third on the stand or carriage.

The budget is an integral part of the accounting system,—not just a tool which, once prepared, is soon forgotten. Machine operations have been designed and planned with that objective in mind. Two bookkeepers find that a full-time assignment awaits them each day in entering order encumbrances, recording income and disbursements, and preparing reports and statements for trustees, department heads, and government agencies.

The accounts receivable bookkeeper is also assigned the duties of a business office telephone operator. Student billing has been confined to incidental items, inasmuch as semester tuition, room and board accounts are payable at registration or on a deferred-payment plan handled by the cashier. The bulk of the billing therefore has been confined to faculty,

Purchasing Office

Handy price and quantity information, a catalog library, a calculating machine, and typewriter and dictating equipment facilitate the work of the purchasing office

At the Treasurer's Desk

Dictating equipment is regarded as the keystone of the treasurer's job

Accounting Office

Bookkeeping machines do the accounting and billing. The records are kept on trays moved on rubber-wheeled stands and are stored in fireproof safes when not in use

Treasurer's Secretary

She answers many routine questions and otherwise relieves the treasurer of as much detail as is practicable

Fireproof Storage Safe

Four-hour safes are in service in the accounting office and in the purchasing office for the storage of valuable records

Business Office Lobby

Facing the cashier's cage. Note how the daylight sifts into the corridor by the arrangement of the cashier's window

townspeople, and those outside of Durham who may use the services or products of the University. The monthly itemized statement and accounting record are completed in one operation. Posting of both charges and credits is done daily; thus on the first day of each month the statement is ready for mailing.

Our student aid program provides for scholarships, tuition grants, a labor-rating plan based on a student's financial need for work to meet college expenses, and a student loan fund. Space for desks and files was obviously the primary requisite. Student loan accounting records are handled by the same machine, tray, and stand method used in general University accounts, and are stored in fireproof safes when not in use.

Telephone Service

The manner of answering the telephone conveys an impression, not only of the individual, but of the organization that the voice represents. Our service was planned with two main lines entering the business office and extensions or stations in the accounting office (two), cashier (one), purchasing office (two), secretary to the treasurer (one), and treasurer (one). A button provides for internal conversation, while holding an outside call, or for general office intercommunication. A buzzer system hooked up independently of the telephone company's lines is the source of the inter-office signal system. The arrangement is sufficiently flexible to permit other members of the staff to receive and route incoming telephone calls in an emergency.

Fireproof Safes

Because the administration building is not of modern fireproof construction, fireproof safes on the main floor were necessary before the business office moved to its present quarters, and are equally essential for the speedy storage of valuable records which might be saved from loss in a fire during office hours and would certainly receive adequate protection should a fire break out during the night. Therefore, two four-hour safes are in service in the accounting office and one in the purchasing office.

Storeroom and Workroom

Our plans for the new business office included a stairway from the main floor to a basement storeroom, workroom, and vault. In our former quarters lack of vault storage space to protect records of various sorts was noticeably apparent. This need has been met quite adequately.

One also likes to find a suitable place to store supplies in an orderly fashion. The downstairs room fills this need. It serves also as a workroom for students who are employed on various jobs from National Youth Administration project funds.

Such a room with sufficient table space permits the spreading out of papers, charts, maps, plans, or budget data more comfortably than on an office desk. It likewise affords an opportunity to be "out" when particularly difficult problems arise that demand uninterrupted thought and study.

Few Changes Required

In reviewing our plans in the light of experience, it is significant that there have been no marked changes in the original layout. An additional member of the staff was engaged for telephone service and accounts receivable billing in the accounting office, and the purchasing staff was increased by a clerical assistant. The only other change has been necessitated more recently by the calling to service of the reserve officer who had been heading up the accounting work, and his temporary replacement by women for the duration of the defense emergency.

If a new administration building were being planned, there would undoubtedly be many suggestions to improve our layout, but if the same quarters were to be allocated in their 1938 state, it would be difficult for us to recommend more effective arrangement and use than now exists.

EQUIPMENT FOR THE TYPEWRITING CLASSROOM

By HELEN REYNOLDS

Assistant Professor of Education, New York University

IT will be desirable to limit the discussion of this problem to typewriting classrooms in public schools, and to divide those classrooms into elementary and advanced groups. Ordinarily, elementary typewriting classes have two objectives: the introduction of the pupils to the skill of typewriting, so that they may decide whether or not they wish to continue with other training in preparation for secretarial work as a career; and the development of such ability in the use of the machine for personal needs as will make of the typewriter an effective writing tool for the student—a writing tool which is at least as effective as his longhand rate and quality of writing.

It is apparent that since these objectives are relatively simple, the equipment of the elementary typewriting room can itself be relatively simple. If, however, only one typewriting room is used to serve the needs of the school, or if all rooms are used for both elementary and advanced class instruction, such equipment must meet the combined needs of both elementary and advanced typewriting. The advanced typewriting class will need certain small office equipment, filing equipment, etc., not essential to instruction in elementary typewriting. A second twofold classification of equipment into essential instructional equipment and supplementary and storage equipment is desirable also.

Kind of Typewriters

In the elementary typewriting classroom, many instructors prefer typewriters of a single make. It is true that such equipment greatly facilitates the first day's instruction in typewriting but, aside from that, there is no particular advantage in it. At any rate, a multiple installation does not interfere with good learning. If the elementary typewriting room also serves the advanced typewriting classes and the transcription classes, then a representative installation of typewriters should be had. Students graduating from the classroom into business should have had experience with the various standard typewriters which they are likely to use out of school. In some communities, one or two makes of typewriters, because of activity of salesmen, nearness of a sales office, speed and quality of repair service, or for other reasons, may so far outnumber other makes of typewriters as to render instruction on the other makes practically academic. This situation makes it desirable that those responsible for the purchase of equipment make a study of the makes of typewriters used in their community in order that the machines will be included in the installation which will make instruction on them realistic for the community to be served. In case typewriting is given primarily for personal use—especially when it is given as an alternative to longhand writing in the grades and incidental to other learnings—portable typewriters have been found to be eminently satisfactory.

In advanced typewriting classes, representative installations should be the rule, and all standard makes, including the noiseless, should be available. It seems wise for the present, at least, to put multi-type typewriters and electric typewriters in the secretarial practice class. These are special machines, somewhat more elaborate than the ordinary typewriter, but they can be mastered in a relatively short time by persons who have developed skill in the use of the standard typewriter.

Desks and Chairs

In order to develop satisfactory skill in the operation of the typewriter and to reduce as much as possible the fatigue resulting from typewriting, good desks and chairs are essential. A desk which is insecure, or which wabbles with the carriage return and jiggles with the action of the typewriter, will eventually reduce the utility of the best typewriter that can be put on it. The typewriter should have a firm, solid base—and it should be fastened securely to that base.

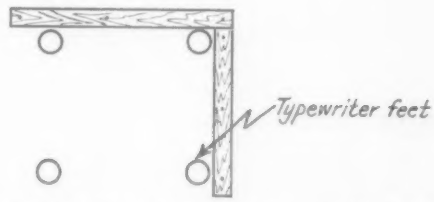
The usual commercial drop-head, so-called dual-purpose stenographic desk is not especially well suited to classroom needs. In the first place, it is a relatively expensive piece of furniture and, in the second place, it is expensive in the floor space it occupies. This type of desk if it must be opened and closed many times a day, as is the case when the typewriting room is continuously in use during one full school session, quickly gets out of order. Its life is much shorter in the classroom than it is in the business office, where one person uses it and opens and closes it usually not more than twice a day. Furthermore, in large classes it is extremely difficult, if not entirely impossible, to prevent accidents from occurring to the

typewriters, because often hurried, inattentive students neglect to center the carriage before closing the desk. Improved types of drop-head desks now available are built with a large enough space that the desk may be closed with the typewriter carriage fully extended. These desks are several inches larger than the more familiar models, and therefore occupy more floor space, thus reducing the number of desks that can be placed in one room. This type of desk serves the office-practice room much more efficiently than it does the typewriting classroom. In the office or the secretarial-practice classroom, the student should have experience working on the conventional stenographer's desk, developing satisfactory desk systems, etc.

A better type of instructional desk for typewriting would be one built with a rigid tub, similar to the desk employed by one of the commercial phonograph companies for use with transcribing machines, but with a narrower ledge at the back—or no ledge.[1] At one side of the table should be a space for the copy, approximately the size of the space at the side of the single-pedestal typewriter desk. This should be at the right, if the recommendation is followed that copy should be placed on the side opposite the carriage return. Actually, it makes relatively little or no difference on which side the copy is placed, provided the typist can so place the copy that he does not need to look directly into the glare from a window. The desk should be provided with two shallow drawers under the table space. In the first drawer should be kept the textbook, a dust cloth, a long soft bristle brush for dusting inaccessible parts of the typewriter, and a stiff type brush. In the second, the student may keep his books, etc., during the class period, thus leaving the relatively small top space of the desk clear for holding copy and supplies of stationery.

Adjusting the Desk Height

In high-school classes particularly, students are likely to vary sharply in size. All of them are not "average" height, and consequently "average-height" desks do not suit them all. An adjustable desk is a rather difficult piece of furniture to get and to use. Most typewriter desks are a little too low for good manipulation of the typewriter. The part of the desk on which the typewriter is placed should be from twenty-six to twenty-eight inches from the floor for the typist of "average" height, but may need to be at least two inches higher for taller persons. In order to secure this adjustability in height, blocks of wood may be fastened to the desk and the typewriter fastened to them, or one or two rubber furniture cups may be placed under each foot of the typewriter and the typewriter fastened to the desk. Or the elevating device may be placed under the legs of the desk. In any event, such schemes for elevating the typewriter should also provide for firmly anchoring the typewriter to the desk. If, for any reason, it is inadvisable to bolt the typewriter to the desk, the typewriter should be fenced in so that it will not travel with the action of the carriage return-lever and thus be pushed off the desk. Two strips of wood nailed at right angles to each other, and so placed as to go along the back and the right side of the typewriter, will accomplish this purpose, as shown above.



Two cleats joined at right angles of such size that the typewriter rests against both the back and the right-hand cleat. This prevents the typewriter from traveling toward the right as the carriage is returned

Typewriter Covers

Rubber typewriter covers should be preserved, and typewriters should be kept covered when not in use. If these covers rip at the seams before the trade-in date for typewriters when new covers can be had, they can be re-sewed by any shoe-repair man for a small charge.

Aids to Good Posture and Good Vision

Typewriter tables of the usual variety are not recommended because they are not strong enough to afford a solid base for the typewriter. No matter how well braced the legs may be, they have a disposition to sway. Furthermore, when the table is all of one level, as these are, the copy from which the typist works is difficult to see—it is too low and results in bad posture and eyestrain.

Of equal importance are the chairs for the typewriting room. The adjustable, good-posture stenographic chair is really essential for good learning, good work habits, and good health. The chair should be of such a height from the floor that the typist can sit with his feet on the floor, his back against the back of the chair, and his arms hanging naturally from his shoulders with the forearms slightly inclined upward to the keyboard. Faulty adjustment of the chair to the height of the typewriter results in faulty stroking as well as in unnecessary fatigue. The back rest should support the typist approximately at the waistline, leaving free the upper back, shoulders, and arms. The position and the pressure of this back rest, as well as the height of the chair seat from the floor should be adjustable. It is to be remembered, how-

[1]A drawing of this type of desk will be found in *Management's Handbook* by L. P. Alford, p. 388. New York: Ronald Press Company, 1924.

ever, that when a small student has to be elevated into the air to reach the keyboard, he must have a foot rest. When posture chairs are not available because of cost or other reasons, shallow-seated, low-backed, rigid chairs should be used. These are available in bent wood and in curved back-rest designs which make good posture possible, although they do not provide for adjustment to variations in height.

A copy holder is an essential for good typewritten work. The best kind of copy holder for all kinds of sustained typewriting is the type which is placed at the back of the typewriter, thus enabling the typist to sit erect and, by means of a device for elevating the copy, to read always from the same distance and the same angle. These are expensive and in the classroom have the disadvantage of obscuring the students from the teacher when she stands at the front of the room. Copy holders to be placed at the side of the typewriter may be made very simply from wood or metal in school shops.

Books may be conveniently stored, without waste of space, inside the box on top of the table. The left side and bottom of the box are open. The leaf projecting from the box holds paper and copy during demonstration periods. The shallow drawer of the desk holds paper and teaching materials

Demonstration Desk

A minimum essential for all typewriting instruction is a demonstration typewriter equipped with a demonstration desk. The make of typewriter used for demonstration should conform to the kind used in the classroom. Of course, in the case of multiple installations, it is necessary only to conform to one of the makes represented in the classroom installation. The demonstration desk should be of such a height that the teacher can stand when using it. This makes the typewriter and the demonstration clearly visible from all parts of the room and leaves the teacher free to use the board and to oversee easily the reactions of his pupils. The effectiveness of the demonstration desk is still further increased if it is placed on a lecture platform at the front of the room. Because teachers as well as students vary in height, it is helpful if the demonstration desk is adjustable in height. It should be so mounted that it turns easily to demonstrate all parts of the machine. The desk should have also one shallow drawer for paper and teaching materials and should be equipped with an adjustable leaf which can be raised to hold paper and copy during demonstration periods or lowered to reduce size when not in use. The desk should be mounted on rollers so that it can be moved easily from one point to another as needed. It should be remembered that the demonstration typewriter is an indispensable piece of typewriting instructional equipment at all stages of typewriting instruction; its use is not limited to instruction in the operative parts of the typewriter.

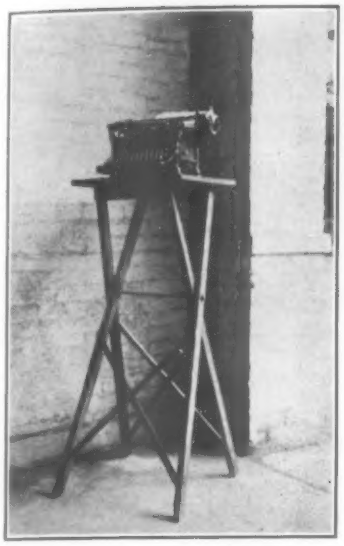
Miscellaneous Equipment

1. *Visual Aids.*—Many typewriting teachers like to use wall keyboard charts for the purpose of intro-

Demonstration desk. The turntable on which the typewriter rests permits easy maneuvering to show all parts of the machine

A general-utility metal table in use as a demonstration desk. This was designed and built at low cost in the vocational department of a high school

Photos Courtesy of The Business Education World



The table top of this collapsible, portable table locks quickly and securely. The table is of a good height for demonstration purposes and can be readily stored when not in use

ducing keys. All typewriter companies have prepared excellent charts for this purpose. In addition, typewriter manufacturers have prepared many helpful charts showing good position and correct operating techniques. These visual aids should not be allowed to remain on the walls month after month, but should be displayed for short periods to secure maximum interest and attention. Similarly, a cork bulletin board, or a burlap screen, placed over a black-board slate may be used as a supplement to instruction by displaying typewritten work or items of interest concerning typewriting. These displays are perhaps most effective when they are developed by pupils and when they are changed frequently and are well displayed.

The use of the motion picture has been introduced into typewriting instruction with considerable success. Thus far, the motion picture has been used chiefly to show manipulation of operative parts, but its possibilities as a means of supplementing textbooks and for the increasing of typewriting facility are being explored. Thus far, however, the motion picture, while a valuable and inspirational addition to typewriting instructional equipment, has not become a minimum essential.

2. *Audio Aids.*—One of the valuable tools for use in typewriting instruction is the interval timer, an alarm-clock device for measuring accurately intervals of time from a quarter of a minute to one hundred and twenty minutes. Not only does this device assure the accuracy of the time interval, essential for comparative purposes in measuring increase of skill, but also its brisk bell serves to keep students alert and spurs them to use all practice periods intensively.

Experimentation has shown that well-chosen music used with certain types of copy has served as a useful device in improving rate and quality of stroking. Waltz, two-step, and march-time records have been shown to develop the best results. One publishing company has a series of "rhythm records" for this purpose. Most schools have phonographs which can be used. Another device for the same purpose, a pacesetter, has been found to be effective in general classroom instruction. This device has the advantage of greater flexibility in rate adjustment than is true of the phonograph.[1] The commercial phonograph, by means of multiple hook-ups, also is used effectively to improve rate and quality of stroking. The use of this equipment makes possible the adjustment of the rate to the abilities of various groups within the classroom and, since transcribing from the commercial phonograph is an important part of the work of many business offices, this procedure has the advantage of accustoming operators to the use of this machine.

3. *Non-Instructional Equipment.*—The typewriting classroom should be provided with a teacher's desk of the flat-topped variety, single or double pedestal depending on floor space and the amount of supplementary storage space available. Minimum tools for minor repairs should be kept in this desk—screwdriver, pliers (one short and one long), and an oil-can. Here, too, are kept the necessary paper clips and elastic bands. Trays—wire or wood—for receiving students' work, as well as for returning it, should be placed on the desk. Since most typewriting classrooms were not designed expressly for typewriting instruction, few have built-in cupboards. A supply cabinet for ribbons, stationery, etc., is needed. In addition, at least one four-drawer filing unit is needed. Here will be kept tests and other supplementary teaching materials, samples of students' work, etc. Furthermore, at least one drawer should be available for the practice in filing afforded by project work in advanced typewriting.

Layout of Typewriting Rooms

Each typewriter should be placed on an individual desk. No more than two desks should touch. The aisles between desks should be wide enough to permit

[1] Dvorak, August, Merrick, Nellie L., Dealey, William L., Ford, Gertrude Catherine: "Typewriting Behavior." American Book Company, New York. 1936. Pp. 307-323.

Typewriter on a general-utility table during a demonstration period. The casters on which the table is mounted enable it to be moved easily to wherever it is needed

Demonstration desk showing relative height as compared with regular typing desks. Notice right pedestal desks necessitating pupils looking toward windows to read copy

the teacher to move about the room freely without inconveniencing students for purposes of supervision and personal instruction. At least thirty inches should be allowed for chair space, so that the student when seated does not have his back against the desk behind him. So far as the student is concerned, it makes little difference whether the daylight comes from the left, right, or the back. So far as the teacher is concerned, it is better for the light to come from left or right. In a room lighted from the right, copy-holding space should be at the left of the typewriter to prevent looking into the glare of the windows and to secure maximum use of the daylight. Venetian shades are most desirable on sunny exposures and should save in electric bills the original cost and upkeep. Without them it is often necessary in a room of this type to draw the shades, shutting out the daylight altogether, and turn on the lights.

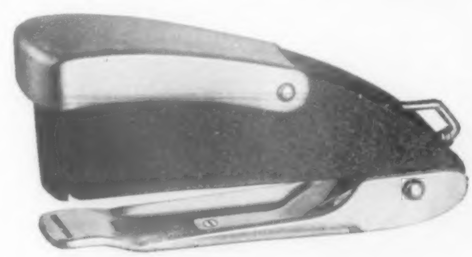
Depending on the size, number, and type of windows, the typewriting room can be twenty to twenty-five feet across from the window side of the room, since daylight will penetrate about that distance. Not more than forty typewriters should be placed in any one room, especially one that is used for elementary typewriting instruction. Where an effort is made to adjust typewriter desks and chairs to size of students, the lower equipment for the smaller students should be placed in the front of the room to insure greater visibility of blackboard and demonstration. Typewriters should be so placed that pupils face the blackboard and the demonstration desk. Aisles around the back, front, and sides of the room should provide adequate space for persons to pass without interference with either the typewriter desks or the supplementary equipment. Supplementary equipment, so far as possible, should be placed at the back of the room. The dictionary on its own stand, and the book case or book shelves with necessary reference books, supplementary typewriting books, etc., should be included with this additional equipment at the back of the room. Waste baskets with solid sides should be so placed as to be convenient for use and not likely to be tripped over. About four of these should be adequate.

Equipment for use in the typewriting classroom should be selected on the basis of its suitability to the instruction being given, its durability, and the consistency of its use. When funds are at all limited, it would be better to forego the purchase of desirable but little-used equipment in favor of building up a reserve for the retirement of obsolescent typewriters, desks, and chairs. Typewriters should be traded in at least every three years. Most schools have found this practice to be the most economical one to follow. As nearly as is consistent with good classroom instruction, typewriting-classroom equipment should be comparable with the best equipment in use in the community.

HOTCHKISS
Norwalk, Conn. Dept. U
"Pioneers in All That's Best in Stapling"

Teachers and School Executives Prefer HOTCHKISS STAPLERS

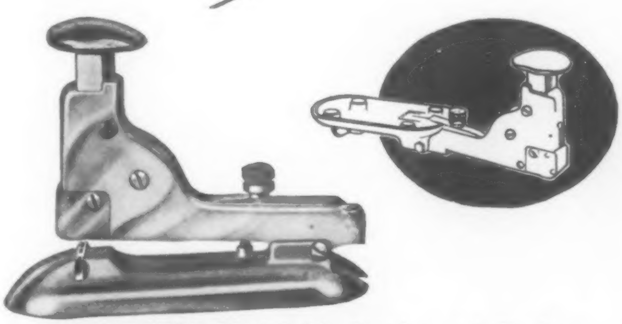
Classroom papers and business forms can be classified and organized better with them. Stapled papers occupy less space in file drawers. Staples require less wire and are economical to use. Hotchkiss staplers are made to stand hard usage and have given years of service in many schools.



HOTCHKISS Model 122P Stapler and Tacker

Here is a handy, double duty stapler and tacker that is small enough to fit in purse or pocket or it can be kept in a corner of the desk drawer. To staple papers, just squeeze it like a plier. It holds 105 economical standard size staples, the same size as are used by most of the larger desk models.

By swinging the base down and around it becomes a useful light duty tacker. Teachers like them for tacking up papers, for pinning drawings on drawing boards and hundreds of other uses.



HOTCHKISS Model 6A Stapler and Tacker

This rugged stapler is in active service on the desks of thousands of busy teachers. Its heavy, die-cast frame and base will stand the hardest use. The capacity of Model 6A is 105 Standard Size Staples and it is fitted with a duplex anvil which permits fastening papers with a permanent clinch or with the Hotchkiss exclusive temporary clinch. The latter type permits the staple to be removed like a pin with the fingers—a very handy feature.

The base may be swung down and locked back so as to use the machine for tacking papers and drawings to walls and drawing boards. Rubber feet in the base prevent scratching desks. Finished in handsome black crackle lacquer.

CHISEL-POINTED
TRADE-MARK

HOTCHKISS Chisel-Pointed Staples
For Easy Stapling

These staples have keen chisel points and penetrate material easier than ordinary blunt pointed ones. They are made of correct gauge wire to micrometer exactness and fit the machines perfectly.

Have your local Hotchkiss Stationer or Wholesaler show them to you or write Hotchkiss direct. The Hotchkiss Guarantee is your protection.

ART METAL CONSTRUCTION COMPANY

Jamestown, New York

BRANCH OFFICES

Baltimore, Md.	Cincinnati, Ohio	Hartford, Conn.	Los Angeles, Cal.	Philadelphia, Pa.
Boston, Mass.	Cleveland, Ohio	London, England	Memphis, Tenn.	Pittsburgh, Pa.
Chicago, Ill.	Detroit, Mich.	Kansas City, Mo.	New York City, N. Y.	Washington, D. C.

600 SALES AGENTS IN ALL PRINCIPAL CITIES

POSTINDEX MODEL 8 DRAWER CABINETS

Postindex Drawer Cabinet Visible File

The Postindex Drawer Cabinets are generally accepted as standard equipment for many school record requirements. They are available in capacities ranging from 500 to 2,500 records, depending upon the number of drawers and card size selected. Standard cabinets are available in 6, 7, 12, 13, 19 and 20 drawer heights, and a large variety of card sizes. Any size and any capacity may be provided for in the Postindex line of Drawer Cabinets.

This line of Postindex equipment is especially convenient for quick reference purposes since the proper drawer may be quickly located by the index on the front, and as quickly extended for finding of the card or record desired. Postindex is also fastest for posting purposes as posting is done without taking the form out of the file.

This type of equipment gives an unusually fine appearance in offices where attention to such refinement is desired. A single cabinet or a battery of these cabinets may be put on a roller caster stand so the installation may be rolled to different locations in the office, or up alongside a certain desk, when particularly desired for prolonged reference or posting.

The trays are quickly removed in case it is desirable to temporarily separate one or several trays from the installation for reference and posting at some other location. The standard trays have on an average of 90 records per tray. This varies slightly one way or the other depending upon the size of the card.

Write for Circular

MODEL 5 FLAT BOOKS AND CABINETS

Model 5 Flat Books are most widely used among school administrators because they are readily adapted to either large or small installations and because of compactness and the convenience in handling. Flat Books are easy to post because they lie flat on the desk. A large number of records are seen at one time as an average Flat Book will hold 140 records. The books furnish a fully protected unit to carry about to any part of the building. They lend themselves ideally to housing in safes when not actually in use. Books may be purchased one at a time to add to present installation. Flat books are made of aluminum and very light to handle.

Write for Circular

PROGRAM STAND

For Indexing of Daily Programs

In junior and senior high schools, and in all other schools having the departmental type of organization, it is considered desirable to have the daily program of each pupil easily available. The program stand illustrated provides for the visible indexing of each child's daily program. Each panel is doubly indexed for rapid reference.

The panels can be removed individually. The sloping standard that holds them is mounted on a rotating base. This construction makes it easy to refer to the records from either side of a counter.

THE EASIEST SYSTEM TO INSTALL, OPERATE AND MAINTAIN

Shift It as You Please

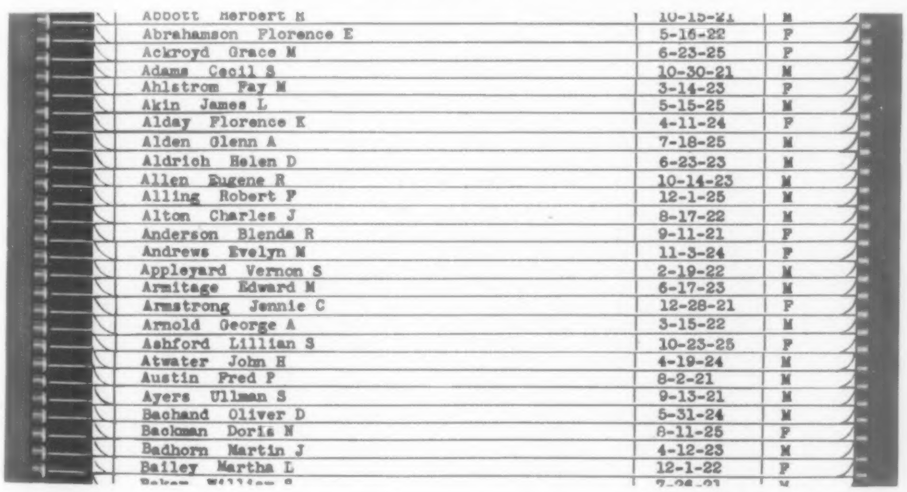
You can remove the units and shift or rearrange them at will. Just pick up the wire, disengaging the trunnion on either side of the channel. And you can shift a handful of forms as easily as a single unit

One Hand Posting

As Only Postindex Gives It to You

Note the perfect lay-back of the forms — because of the trunnion action — which keeps the left hand free for ''finding'' while the right hand is free for posting

INDEX ALWAYS IN SIGHT AND ALWAYS IN PLACE



As this "close-up" view of a Postindex tray shows very clearly, each form unit is held in precisely uniform alignment and "exposure" with all of its neighbors. Here again, the patented trunnion is directly responsible for a highly important Postindex advantage. For a system cannot be a true time saver when it requires constant realignment, adjustment or correction —the kind of attention Postindex does not require.

Note the military precision of the trim-rounded trunnion ends. The shoulder-to-shoulder position of the trunnions makes it impossible for any one form unit to "hide" under the form above or below it. Thus the index line always has 100% visibility—so important for swift fact and figure finding and equally important in posting.

HINGE CLIPS FOR SINGLE CARDS

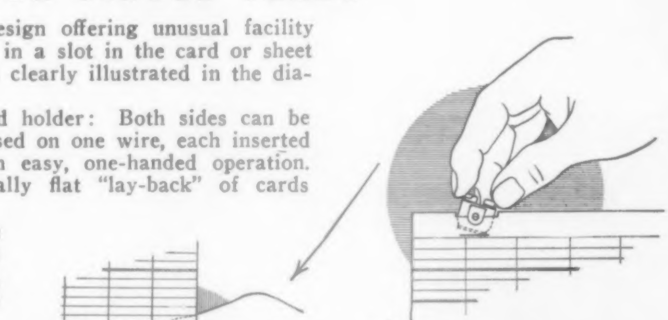
ARTINDEX Hinge Clips are metal tabs of patented design offering unusual facility and freedom of handling. The tongue of the clip engages in a slot in the card or sheet which is thus securely held. The use of the Hinge Clip is clearly illustrated in the diagrams on this page.

Here are some of the many advantages of this new card holder: Both sides can be posted without removal from holder. Two cards can be used on one wire, each inserted and removed independently. Insertion and removal is an easy, one-handed operation. There's no slipping or tearing out of clips. Exceptionally flat "lay-back" of cards either way.

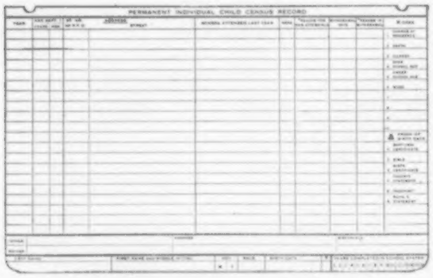
Your present vertical file can be converted, to give you the many advantages of Visible Filing. And give them to you easily and quickly! The Hinge Clip holder makes this change, without even copying old records or new cards. This saves time—saves money—saves material.

Artindex Hinge Clips slip off easily without mutilation of cards or hinges when cards are to be transferred to a vertical file.

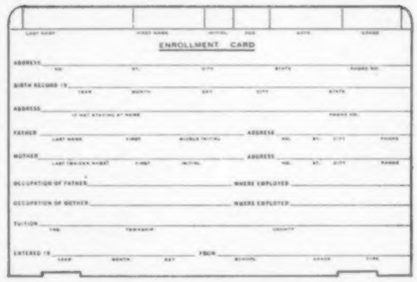
Using the Hinge Clips, the average rate of change-over is a thousand cards a day. Tabs need not cover printing on forms. Ask for a sample Hinge Clip and card, and name the record and quantity you use.



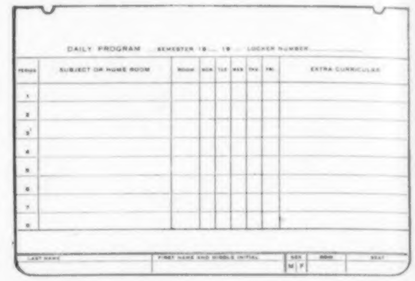
Snap on the Hinge Clip, Cross the Wire and — It Slips Readily Into Place



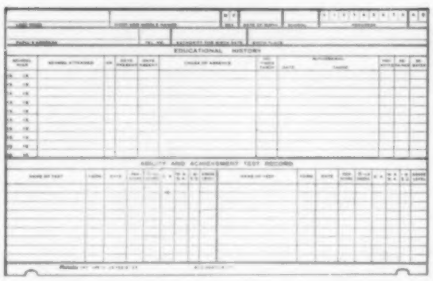
Individual School Census Card
Postindex form 81-C-6385-8. This shows one side of a two-page card which incorporates complete census information and attendance information. The back side of this card shows history of employment



School Enrollment Card
Postindex form 81-B-2916-8P. This is a two-page form with illustration showing the enrollment record. The back side of this same card covers daily program record

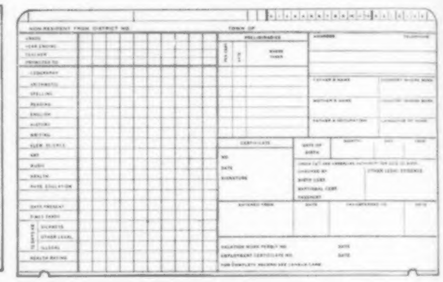


Individual Child's Daily Program
Postindex form 81-B-2913-8. This is a four-page form with illustration showing the daily program for a student. The other pages are devoted to registration information and attendance



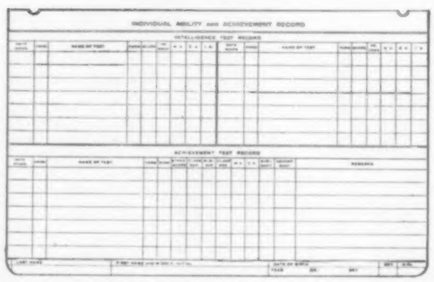
Individual Pupil Cumulative Record
Postindex form 81-C-06072-8CT. This illustration shows one page of a four-page form covering educational history, ability and achievement test record. The other three pages provide for scholarship record and health information

Secondary School Cumulative Record
Postindex form 81-C-05971-8CT. This illustration shows one page of a four-page form with academic record and attendance information. The other three pages provide for general information, extra curricular activities, achievements, with space for intelligence and achievement tests



School Cumulative Record
Postindex form C-4077-P. This is a four-page form with illustration showing the elementary scholastic record. One of the other pages covers scholastic record for Junior and Senior High School while the other two pages provide space for recording pupil activities, guidance facts, intelligence and achievement tests

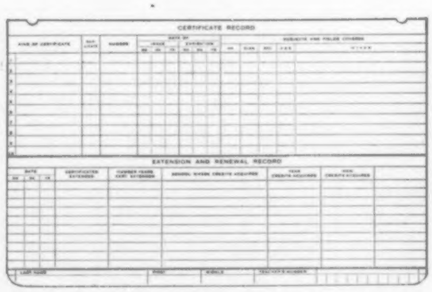
Individual Health Record
Postindex form 81-C-06121-8CT. This is a four-page record with illustration showing a portion of health history. The other three pages are devoted to a continuation of the same record



Individual Achievement Record
Postindex form 81-C-6387-8. The illustration shows front side covering intelligence tests and achievement tests. The back side is a continuation of achievement tests

Teacher's Card
Postindex form 81-C-06112-8CT. This is a four-page record with illustration showing teacher's experience. The other three pages are devoted to personal information, educational background, special training and certification, health and general remarks

County Financial Accounting Record
Postindex form 81-C-06111-14CT. This is a four-page form with illustration showing financial record. Other pages are devoted to census, enrollment, attendance and information about board members, also State and County financial support



Florida Form
Postindex form 81-C-6370-8. This is a four-page form with illustration showing the teacher's certification, extension and renewal record. The other three pages are devoted to experience, training and general information

Wisconsin Form
Postindex form 96-C-5740-14. This is a four-page form with illustration showing State Aid data. The other three pages provide record in regard to statistical information, census, enrollment and teachers

ART METAL for the ADMINISTRATIVE OFFICE

The Art Metal Construction Company, Inc., offers a functional application of its products and services to modern school building situations. The scope of its furniture—from the most modern desks, tables, bookcases, safes and visible files for the administrative office to special equipment for the library, corridor, laboratory, shop lecture rooms and storeroom—is an illustration of its wide interests and services.

VERTICAL FILES

"Director" Files for every standard record in units from desk-high to five-drawer sizes. These highest grade files have lifetime ball-bearing roller suspensions and a new, improved side-lock compressor

ART METAL AIRLINE DESKS

Art Metal's new desk creation is the Airline which has gracefully rounded Island Bases under each pedestal and black artolin top with white satin finish hardware

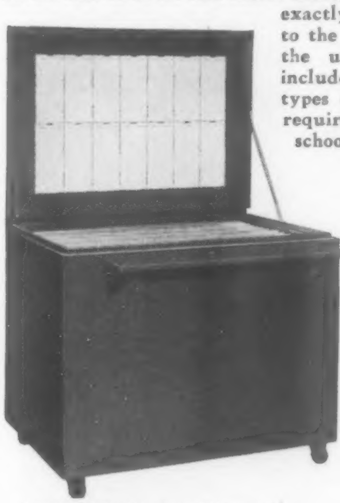
Airline desks may also be equipped with the new Art Metal Fold-O-Way typewriter device and as in all Art Metal desks, may be exactly fitted to the work of the user and includes all types of desks required in the school office

STORAGE CABINETS

Art Metal Storage Cabinets for all storage purposes come in single and double door widths, also in desk heights and may be had with wardrobe fittings

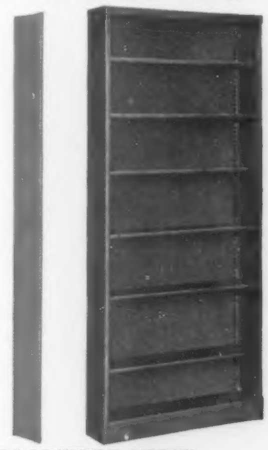
FIRE SAFES

Art Metal Fire Safes, available in twenty styles and sizes, preserve valuable records against fire or theft. Tested and approved by the Underwriters' Laboratories



ART METAL PLANFILES

The exclusive feature of Art Metal Steel Planfiles consists of compression pockets which hold drawings, tracings, blueprints, in folders—upright, flat and perfectly smooth



BOOKSHELF UNITS

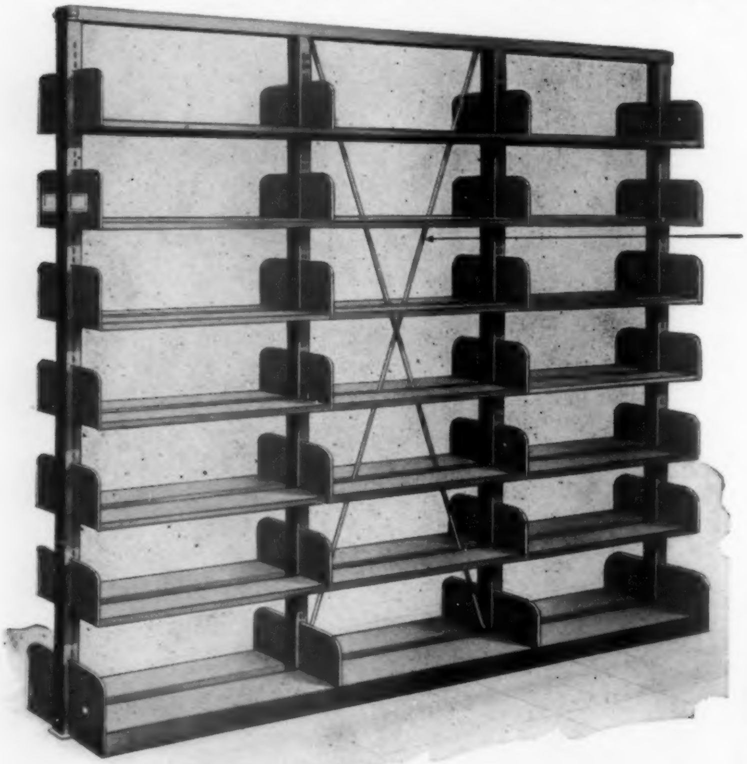
This is the famous Space-A-Shelf unit using the Art Metal library shelf adjustment principle. Detachable end panels are used to save space in batteries of units—especially suitable for schools

MUSEUM CASES

Shown at the left is a recessed wall case about 12 feet long and equipped with semi-indirect lighting which emenates from behind the central pilaster. This case has sliding doors. Cases can also be furnished with doors hinged at the top or side, also with removable panels. A case of this kind is particularly advantageous for displaying educational exhibits

Art Metal flag, trophy and museum cases are of patented dust-tight construction and may be had in table type or free standing cabinets with or without shelves and with glass solid backs for the display of exhibits as required by schools

ART METAL FOR THE SCHOOL LIBRARY



ART METAL "UNITYPE" BOOKSTACKS

Two types of UNITYPE Bookstacks are offered (as shown on this page): Free-Standing Stacks and Top-Braced Units, both models single or double-faced.

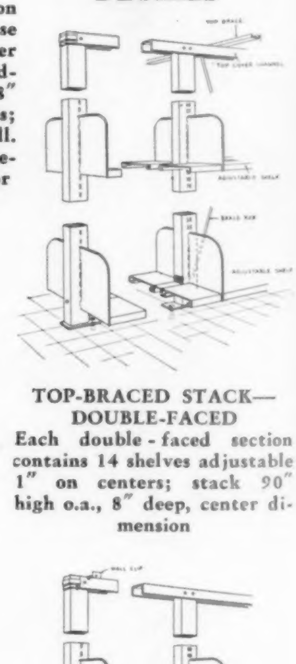
The TOP-BRACED bookstack is recommended for locations where it is undesirable to use floor fastenings. Top bracing makes floor fastening unnecessary.

ART METAL EQUIPMENT FOR LIBRARIES INCLUDES

- **Standard Type Book Stacks**
- **Bracket Type Book Stacks**
- **Bracket Type Rolling Book Stack**
- **Charging Desks**
- **Vertical Files**
- **Stairs and Railings**
- **Booklifts**
- **Card Catalog Files**
- **Reading Tables**
- **Magazine Racks**
- **Book Trucks**

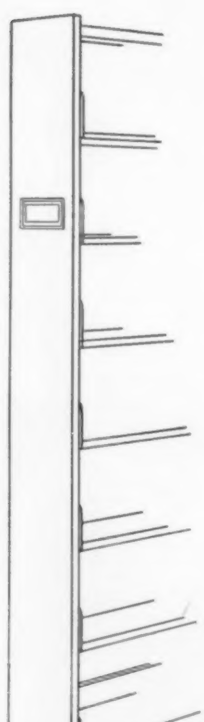
FREE-STANDING UNIT —DOUBLE-FACED
Each double-faced section contains 2 closed base shelves 10″ deep, center dimension; 12 shelves adjustable 1″ on centers 8″ deep, center dimensions; stack 90″ high overall. Each unit must be securely fastened to floor

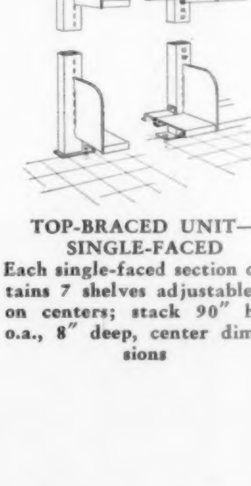
CONSTRUCTION DETAILS



TOP-BRACED STACK— DOUBLE-FACED
Each double-faced section contains 14 shelves adjustable 1″ on centers; stack 90″ high o.a., 8″ deep, center dimension

FREE-STANDING UNIT—SINGLE-FACED
Each single-faced section contains 7 shelves adjustable 1″ on centers, stack 90″ high o.a., 8″ deep, center dimension. Fasten securely to floor





TOP-BRACED UNIT— SINGLE-FACED
Each single-faced section contains 7 shelves adjustable 1″ on centers; stack 90″ high o.a., 8″ deep, center dimensions

BERGER MANUFACTURING DIVISION

OFFICES IN PRINCIPAL CITIES
Baltimore
Birmingham
Boston
Buffalo
Chicago
Cincinnati
Cleveland
Columbus
Dallas
Denver

REPUBLIC STEEL CORPORATION

Canton, Ohio

OFFICES IN PRINCIPAL CITIES
Detroit
Indianapolis
Kansas City
Los Angeles
Minneapolis
New York City
Philadelphia
Pittsburgh
San Francisco
St. Louis
Toledo

STEEL LOCKERS

Type S.S. Single Tier

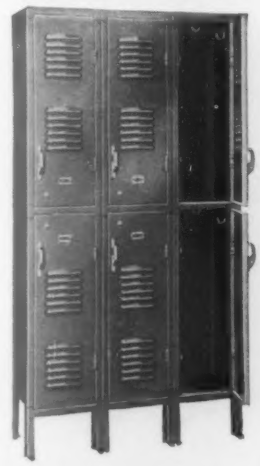
STORAGE SHELVING

Berger Steel Equipment is manufactured by an organization with more than fifty years' experience in making equipment for the modern school and university. Berger equipment is built to meet the most rigid requirements for durability, utility and structural perfection. All items are quickly available in practically every size and type. Experienced Berger engineers will be sent anywhere without charge to assist architects, builders or purchasing agents in planning new installations.

The single tier standard louvre is the most popular general purpose locker

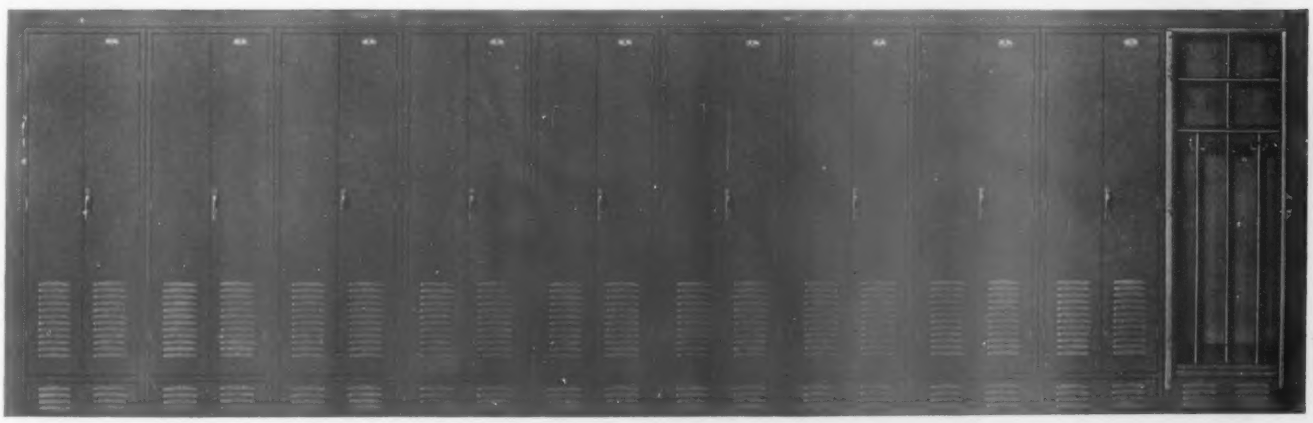
SHOP EQUIPMENT

Type S.D. Double Tier

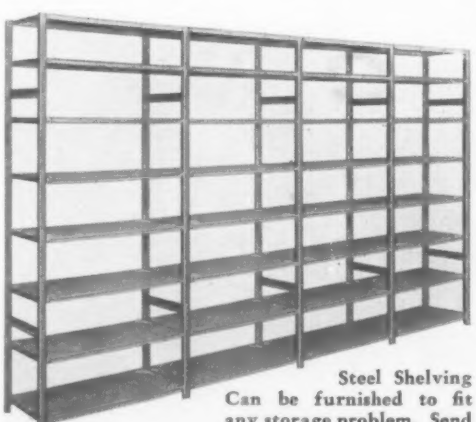


A double tier standard louvre locker. Send for Catalog No. 493

DOUBLE-DOOR CLASSROOM WARDROBE



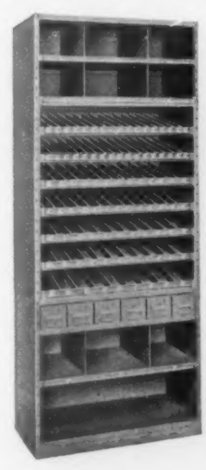
Berger classroom wardrobes provide the essential requirements for handling pupils' clothing in elementary schools. Send for Catalog No. 481.



Steel Shelving
Can be furnished to fit any storage problem. Send for Catalog No. 509

Berger Open Type Shelving

Work Bench
Berger benches are available in many combinations. Send for Bulletin No. 525



When many small items must be stored and protected, Berger Flexi-Bilt units offer many advantages not found in any other type of construction. Send for Catalog No. 554

Flexi-Bilt Units

DURABILT STEEL LOCKER CO.

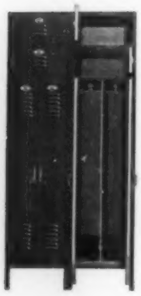
615 Arnold Avenue, Aurora, Ill.

SALES OFFICES IN ALL PRINCIPAL CITIES

THE ANSWER TO YOUR CLOTHING AND EQUIPMENT STORAGE PROBLEM IS

D U R A B I L T

Durabilt Steel Lockers and Durabilt Steel Cabinets are the result of hundreds of tests and experiments based on the careful study of large installations in daily use, in schools, clubs, offices, industrials, etc., as well as the experience gained through years of specialization in the building of locker and cabinet equipment. Before you buy—before you specify—compare others with the Durabilt line—study the details of construction—check the specifications—see for yourself that here in this equipment, embodying so perfect a combination of neatness, sturdiness and many unique features, is the logical solution to your clothing and equipment problem.



DURABILT STEEL LOCKERS . . .

Durabilt Steel Lockers are renowned, in addition to their economy, for their features of distinctive design and attractive finishes; for their wide range of adaptability; for their sturdiness and modern refinements of construction.

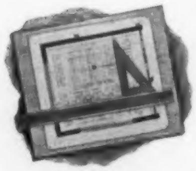
Your requirements may be for school, club, factory, store, office, bank or lodge hall—they may be for thousands of lockers for new buildings or for a few hundred to provide increased facilities in present ones. No matter what the condition or the need, Durabilt is your assurance of meeting, in every respect, every architectural and service requirement.

DURABILT

"No better built than Durabilt!"

DURABILT STEEL CABINETS . . .

Durabilt Steel Cabinets fill a long-felt need. Space savers—money savers, too—they are unlimited in application. Their range of uses is so wide, due to the numerous sizes available and the innumerable combinations of adjustable interior equipment, that they readily meet all storage requirements of business, social, educational, or institutional establishments.



DURABILT ADVISORY SERVICE

While Durabilt Lockers and Cabinets have been standardized to meet the majority of needs, we are prepared not only to submit sketches on special designs but also to assist in an advisory capacity the preparation of any locker plans and specifications that may involve unusual considerations and conditions. A request to any of our sales offices or to us direct, will bring a Durabilt Sales Engineer to your assistance. Send for our Catalog No. 5077.

SINGLE TIER LOCKERS

Single Tier lockers provide service in a most convenient form. They are available in the practical heights of 60 or 72 ins. and in the various widths and depths given in the table on page 5 of Catalog 5077.

Single Tier

A Single Tier locker of small dimensions, say 12 ins. wide, 12 ins. deep and 60 ins. high (not including the legs), capably takes care of any ordinary requirements for individual use. The size of the locker, however, should be increased in such cases as school "team" rooms, gymnasiums, etc., in order to make the storing of athletic uniforms, equipment, etc., more convenient. The Single Tier locker is regularly provided with a hat shelf. Because this shelf decreases the space for hanging clothes, authorities generally prefer the 72-in. locker, for the average use, better than the 60-in. locker. Space limitations determine, of course, the size and number of the Single Tier lockers to be installed, but competent planning and careful use of available floor space will reveal the surprising adaptability of this type of locker to orderly and efficient locker rooms.

Standard equipment for Single Tier lockers includes the hat shelf, one double prong ceiling hook and three or more single prong side hooks, depending on size of locker. Equipment can be varied to meet individual requirements. Specifications are given on page 10 of our Catalog 5077.

DOUBLE TIER LOCKERS

The Double Tier locker is economical as to space and cost. Necessarily, it is more cramped and provides less storage capacity. This type of locker, however, is ideally suited to conditions where large storage space is not required such as for smaller and younger pupils in grade schools. Double Tier lockers are often used in combination with Single Tier or Multiple Tier lockers to form units that meet the storage problems of almost any unusual condition. In schools, gymnasiums, clubs, etc., Double Tier lockers are often utilized for the storage of gym shoes. In such use, standard equipment is replaced by partitioned shoe compartments, 6 x 6 ins.; the capacity is from 10 to 18 compartments per locker, according to locker size. While 6 x 6 ins. is the accepted size for shoe compartments, other sizes that work out on multiples can be furnished. Single Tier lockers may also be thus utilized.

Double Tier

Standard equipment is the same as for Single Tier lockers, with the hat shelf omitted. Specifications are given on page 10, sizes on page 2 of our Catalog 5077.

MULTIPLE TIER (Box) LOCKERS

Multiple Tier (Box)

Multiple Tier (Box), or small compartment lockers as they are sometimes called, have a wide field of usefulness. They can be used to advantage wherever small storage space is required. In schools, gymnasiums, clubs, etc., they are ideal for storing gym suits and shoes, books, lunches, etc. In factories, offices, stores, etc., they are widely used for storing small tools, work shoes, overalls, etc. In combination with Single Tier or Double Tier lockers, they are especially popular.

Like all Durabilt Lockers, they can be furnished for recessing in walls, in single row for arrangement along the walls or in double row or back to back arrangement. They come in tiers three or more high and as many lockers wide as space or requirements permit. No shelves or hooks are furnished with Multiple Tier (Box) lockers. Specifications will be found on pages 10 and 11, sizes on page 2 of our Catalog 5077.

GYMNASIUM LOCKERS

While in many schools, clubs, lodges, etc., having gymnasiums the average requirements can be taken care of by Double and Multiple Tier lockers arranged according to conditions, the modern trend is toward a combination arrangement shown in the illustration. This type is usually termed "Gymnasium Locker Unit." A complete unit consists of one standard Single Tier locker in combination with double tier lockers, two high, in sections two, three or four wide. Multiple Tier (Box) lockers can be added, of course, to suit individual requirements.

Gymnasium Locker Unit

Standard equipment consists of one hat shelf in large compartments. All compartments have one double prong ceiling hook and three or more single prong side hooks depending on size of locker. Various combinations consisting of Single Tier lockers, Double Tier lockers, two or three high and Multiple Tier lockers can be made up. Specifications are given on page 11 of our Catalog 5077.

GYMNASIUM LOCKER SIZES
(Dimensions are in inches)

Large Comparements	Small Compartments	
W. D. H.*	6 x 12 x 30	Double Tier Arrangement
12 x 12 x 60	6 x 15 x 36	Double Tier Arrangement
12 x 15 x 72	7½ x 12 x 30	Double Tier Arrangement
15 x 15 x 60	7½ x 15 x 36	Double Tier Arrangement
15 x 15 x 72	9 x 12 x 20	Triple Tier Arrangement
	9 x 15 x 24	Triple Tier Arrangement

* Overall height, including legs, is 6 ins. greater.

LOCKER ROOM BENCH TOPS AND PEDESTALS

Quite often, customers want to purchase their locker room benches locally, while others prefer that we furnish them. In order to extend complete service to our customers we are prepared to furnish Bench Tops and Pedestals as follows:

Locker Room Bench (Bench Top and Pedestals)

BENCH TOPS

Yellow pine seems to be the most popular wood for locker benches and, unless otherwise specified, we will always furnish it. Our bench tops are carefully sanded with rounded corners and edges, and finished with one coat of shellac and one coat of varnish. Ordinarily, tops are furnished in 6, 8, 10 or 12 ft. lengths, either 8, 10 or 12 ins. wide and 1½ or 2 ins. thick. (Dimensions are nominal.)

BENCH PEDESTALS

These strong and rigid pedestals are of our special design. They are made with heavy cast iron base and top approximately 7 ins. in diameter, and a strong tubular column 1½ ins. in diameter. There are four holes in the base and four in the top for attaching to floor and bench. Finish is baked-on black japan. Pedestal weighs approximately 7 lbs. Standard overall height is 16½ ins. but other sizes can be furnished. Pedestals should be placed 1 ft. from each end of bench top and not more than 5 ft. apart. When ordering, always give size of benches and quantity of pedestals required.

Pedestal

"No better built than Durabilt!"

THE GLOBE-WERNICKE CO.

Cincinnati, Ohio

Makers of Over 4000 Items Needed in Offices

Dependable Quality

BRANCH OFFICES
New York . . . 76 Ninth Ave.
Chicago . . 367 W. Adams St.
Washington, D. C.
802 Rhode Island Ave. N.E.

ENJOY THE ADVANTAGES OF ATTRACTIVE AND EFFICIENT GLOBE-WERNICKE EQUIPMENT FOR OFFICES AND LIBRARIES

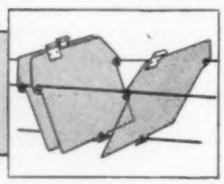
It pays to modernize your office and library with dependable Globe-Wernicke equipment that enables people to do more and better work with less effort . . . keeps office routine operating smoothly and accurately . . . increases efficiency and economy.

Globe-Wernicke offers an extensive selection of dependable business and library equipment and supplies. For 59 years this company has been a leader in its field with a reputation for business integrity that is based on a policy of fairness to all.

FILING CABINETS

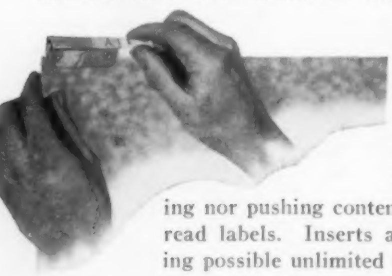
There is a G/W steel or wood file for every business need and price range. Standard inserts may also be had including document file, double box drawer and card index drawer.

Better grades of letter and legal size files have the patented Tri-Guard feature, an exclusive Globe-Wernicke development.



A "V" shaped filing pocket is created by a touch of the fingers and makes it easy to file or find. Tri-Guard guides slide on three rods which act as a "sway-check" and keep contents of drawer upright without compression.

ANGULAR CELLULOID TAB GUIDES



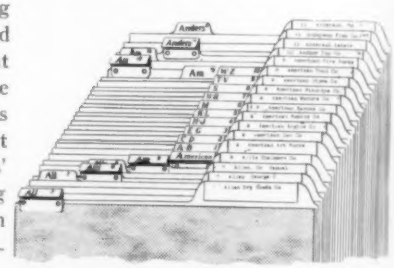
Tabs are set at an angle of 45°. These index tabs look you straight in the eye . . . they are easy to read, easy to find. There is no stooping nor pushing contents about in order to read labels. Inserts are removable, making possible unlimited expansion.

DESKS AND TABLES


The "STREAMLINER"

Many exclusive features of construction and design make G/W steel or wood desks and tables very desirable for office and school use. These fine desks represent highest standards of quality and combine efficiency, distinctive appearance, durability and long, useful service. They are made in styles and sizes for every office requirement . . . including the attractive new, modern "Streamliner" and "Defender" series . . . outstanding triumphs of design and fine craftsmanship.

G/W SAFEGUARD FILING PLAN

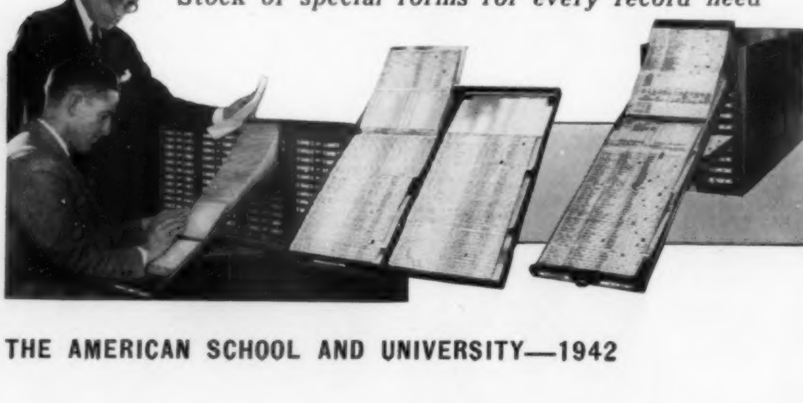


The Safeguard filing plan is a simple and practical arrangement of indexing and may be used for card records and correspondence. It is based on 59 years' experience in solving filing problems and can be applied to every filing requirement.

Write for free 8-page circular, which illustrates and describes the Safeguard filing plan, the safest, simplest, best and easiest way of "filing and finding."

THESE IMPROVED GLOBE-WERNICKE VISIBLE SYSTEMS CAN BE USED FOR EVERY RECORD-KEEPING REQUIREMENT

Stock or special forms for every record need



VISIBLE RECORD EQUIPMENT

The Globe-Wernicke visible record system can be used by any organization, regardless of size, to provide important facts instantly. Both cabinets and books are available in various styles and sizes. Signals call attention to matters that require prompt attention. This control system saves time, work and money. Stock or special forms are provided for any type of record need.

EVERYDAY FILES
Handy, inexpensive . . . furnished in eleven styles . . . indexed alphabetically. . . . Made in standard and legal sizes. Speeds up sorting.

"ACCESSO" WOOD DESK TRAYS
Wide hand openings on all four sides and bottom make it very easy to handle papers . . . two sizes.

AGATE CARD INDEX TRAYS
Sturdily built . . . made of heavy binders' board . . . wood bottom . . . steel follower . . . 3" x 5", 4" x 6", 5" x 8", 6" x 9", and check file sizes.

FIBREBOARD TRANSFER CASE
Substantial . . . built to give long, useful service . . . collapsible . . . easily and quickly set up . . . lid type . . . no strings . . . made in 14 sizes.

SECTIONAL BOOKCASES

Globe-Wernicke sectional bookcases are available in several distinctive designs and standard finishes for school, home and office. They combine attractive appearance, convenience, efficiency and economy. Unit includes top, base, and book sections of four different heights. More sections are easily added when needed.

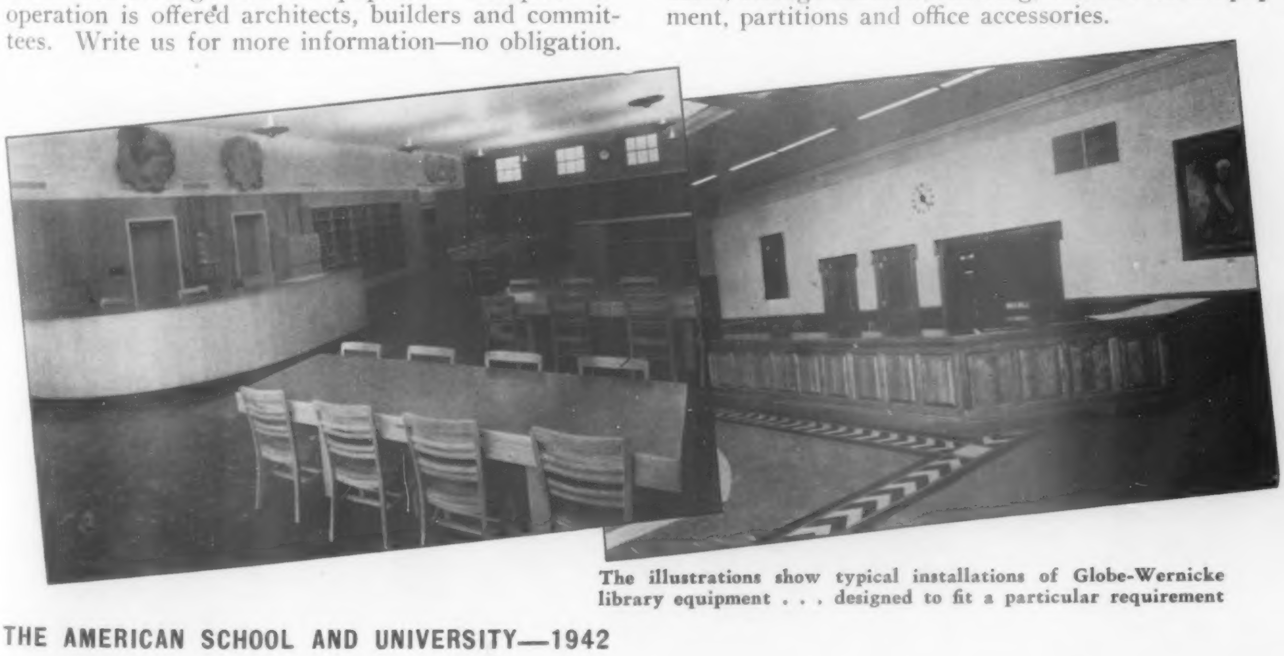
HORIZONTAL SECTIONS

There are numerous kinds of Globe-Wernicke stock steel horizontal filing sections and units which may be combined to fit individual requirements. These horizontal sections are light in weight, strong, and easy to intermember or rearrange. There are two standard depths and widths: 17" and 25" deep and 33" and 16½" wide.

LET US HELP MODERNIZE YOUR LIBRARY TO MAKE IT MORE USEFUL AND ATTRACTIVE . . .

Whether planning a new library, an addition to your present one, or some individual pieces, let us help solve your library problems including design, finish and arrangement of equipment. Complete cooperation is offered architects, builders and committees. Write us for more information—no obligation.

Globe-Wernicke products include stock and special equipment for schools, libraries and public buildings; also filing equipment and supplies, desks, tables, bookcases, storage cabinets, shelving, visible record equipment, partitions and office accessories.



The illustrations show typical installations of Globe-Wernicke library equipment . . . designed to fit a particular requirement

LYON METAL PRODUCTS, INCORPORATED

1334 Madison Ave., Aurora, Illinois

FACTORIES: Aurora and Chicago Heights, Illinois
PLANTS: Los Angeles, Calif.; New York, N. Y.

SALES OFFICES IN ALL PRINCIPAL CITIES. CONSULT YOUR CLASSIFIED TELEPHONE DIRECTORY

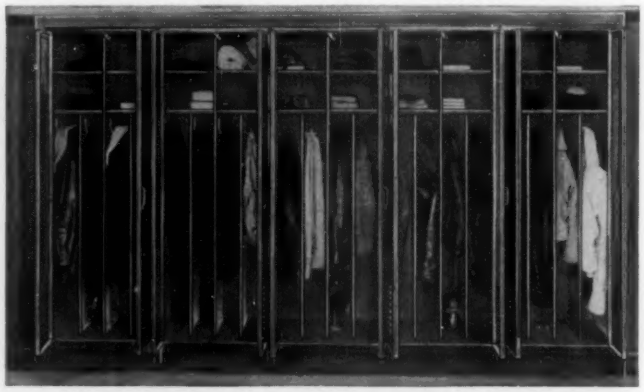
Steel Lockers, Folding Chairs, Storage Shelving, Cabinets and Vocational Shop Equipment

FOR forty-one years Lyon equipment has passed the most rigid requirements of the best school systems. Hundreds of installations made years ago are still giving excellent service and withstanding the daily hard use given them by grade and high school pupils.

Illustrated on this page are a number of Lyon Products required by modern schools. Write for complete catalogs on these and other steel products.

LOCKERS
A type and size for every storage requirement. Write for Catalog No. 233.

FOLDING CHAIRS
Seven styles available in a variety of colors and two-tone combinations. Tablet arms, chair trucks and ganging equipment also available. Catalog No. 835.



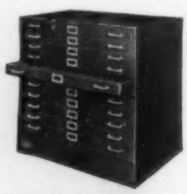
LOCKER WARDROBE
One master locking device gives teacher complete control and supervision of pupils' clothing. Many interior arrangements available. Write for Catalog No. 243.

TOOL CRIB
For safe and orderly storage of all types of tools. Easily adjusted to new requirements. Catalog No. 331.

STEEL WORK BENCHES
Complete line—many accessories. 144 models to choose from. Catalog No. 331.

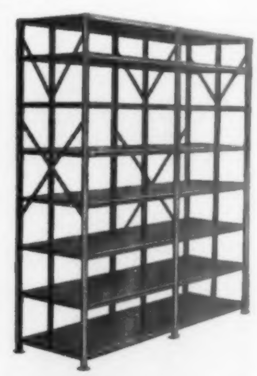
STORAGE CABINETS
Available in many types and sizes. Write for Catalog No. 421 for complete details.

SHEET METAL WORK BENCH
Designed especially for vocational schools. Maple top with two stake plates set flush. Ample storage space and extreme rigidity. Catalog No. 331.



BLUEPRINT CABINETS
For flat storage of blueprints, maps, and other large papers. Sectional type—permitting cabinets to be stacked one upon the other. No finishing strips necessary. Two types of bases available. Catalog No. 894.

LOCKER DRAWING TABLE
Designed to accommodate four drawing classes per day. Roomy lockers provide security for each student's equipment. Catalog No. 331.



STORAGE SHELVING
Completely standardized and interchangeable. Easily adjusted to special requirements. Catalog No. 118.

SEE LYON AD ON PAGE 435

FRED MEDART MANUFACTURING CO.

3568 Dekalb St. St. Louis, Mo.

Manufacturers of

Steel Lockers—Steel Wardrobes (The Lockerobe)—Steel Shelving Gymnasium Apparatus—Basketball Backstops—Telescopic Gym Seats Automatic Electric Scoreboard and Timer

STEEL LOCKERS

"Standard of Comparison," the title by which Medart Lockers are widely acknowledged both in the industry and among knowing buyers, is fittingly applied. . . . "Medart" has long served in the role of pioneer in the Locker manufacturing field and as a result, most of the details common in all lockers today first appeared as part of a Medart Locker. . . . All lockers are not alike. . . . In the current model, "Medart" includes a number of exclusive and desirable features that merit the careful consideration of the buyer. Compare!

Write for Locker Catalog L-7

STEEL WARDROBES
The Lockerobe

Space wasting cloakrooms and less efficient wardrobes are rapidly giving way to the modern thought in elementary school wardrobe equipment — The Medart Steel Lockerobe. Lockerobes require a recess depth of only 16 inches! One of the most important of the several functional advantages of Lockerobes, which is of special interest to school officials, is the system of simultaneous door control as provided by "Medart." Supervision of the wardrobe doors is reduced to a minimum. The teacher or a monitor quietly opens and closes all wardrobe doors by the simple operation of one pair of doors. Complete details upon application.

Write for Lockerobe Catalog LRM-4

STEEL SHELVING

Books, classroom supplies, etc., are stocked better, inventoried quicker, and distributed faster when the storeroom is equipped with Medart Steel Shelving. . . . Easy to install, safe to use, and readily dismantled (all parts are interchangeable) for future rearrangements. . . . Medart Steel Shelving fully conforms to the exacting specifications of the Federal Government. . . . Complete engineering service available to interested parties without obligation. . . . "Let Medart lay out your stockroom equipment requirements."

Write for Shelving Catalog S-7

METAL OFFICE FURNITURE COMPANY

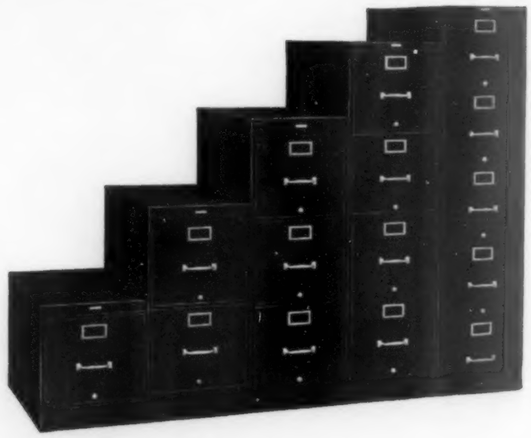
Grand Rapids, Michigan

FACTORIES IN Grand Rapids Michigan

BRANCHES IN New York City 604 W. 37th St. — Boston 115 Purchase St. — Los Angeles 923 E. Third St. — Seattle 609 Third Ave.

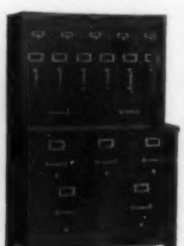
DEALERS IN ALL PRINCIPAL CITIES

STEELCASE *Business Equipment*



DESKS AND TABLES

Five grades of desks and tables, including the modern roll edge type with island base, are available for every office requirement. Made in a complete range of types and sizes. All are attractive, efficient, economical and will give a lifetime of service.



SECTIONAL EQUIPMENT

Adaptable to large offices or to small departments or offices where requirements are limited to no more than a single letter file and a card index file. Extreme flexibility of wide and narrow sections permits additions to serve every need.

BOOKCASES

These glass door bookcase sections are substantially constructed units, carefully designed and built. Doors are of disappearing type, dust-proof with equalizing device. Three heights, with top and base, intermember perfectly, permitting easy expansion.

Built-to-Order Equipment

Display and Museum Cases

Write for Details

FILING CABINETS

Steelcase files are made in several grades of construction, in suspension and non-suspension types, in various heights from 5-drawer down to single drawer units, in a drawer arrangement for every purpose, in attractive and substantial finishes.

STORAGE CABINETS

Twenty-one sizes and styles of cupboards and wardrobes provide a stock unit for every storage requirement. They are attractively finished, strong and sturdy in construction and very convenient and adaptable in use.

SHELVING

Three types of steel shelving provide the proper kind for use wherever shelf storage is required, whether in libraries where an attractive appearance is necessary or in store-rooms where heavy loads require reinforced shelves.

CHAIRS

Steelcase "Easyrest" chairs offer all the advantages of comfort, long life, beauty and efficiency. The Posture chair may be correctly adjusted in one operation by the occupant while seated. The resilient spring back may be locked into a rigid position at will.

METAL OFFICE FURNITURE COMPANY

Grand Rapids, Michigan

FACTORIES IN	BRANCHES IN				DEALERS IN
Grand Rapids Michigan	New York City 604 W. 37th St.	Boston 115 Purchase St.	Los Angeles 923 E. Third St.	Seattle 609 Third Ave.	ALL PRINCIPAL CITIES

STEELCASE
Business Equipment

TERRELL STEEL LOCKERS

4 ADDED ADVANTAGES AT NO EXTRA COST

Adaptability

A complete range of sizes and styles meets every need of school or gymnasium. Any grouping of full-height, double-tier or box lockers can be supplied.

Safety Handle

All fastening points are concealed in handle. Pilfer-proof, since handle cannot be pried off. Padlock eye is also concealed in handle.

Latching Bar

No meddling possible because the bar is of channel formation and fits into the formed channel on the door. Single tier locker doors have three latching points, double tier have two.

Pre-Locking Device

Positive in operation, pick-proof, simple in design. When door is opened, padlock may be replaced and locked, or key turned, then when door is closed it is automatically locked. This device also permits the use of automatic combination locks.

Silenced Operation

Soft molded rubber bumpers are securely riveted and tenoned into door jambs. Similar bumpers silence latching bars.

Sturdiness

Rigid construction, all welded frame corners. All door corners welded. These and other features add to the strength of the lockers.

Locker Legs

Independent of locker bodies—legs can be spaced two, three or more lockers apart to simplify floor cleaning.

Appearance

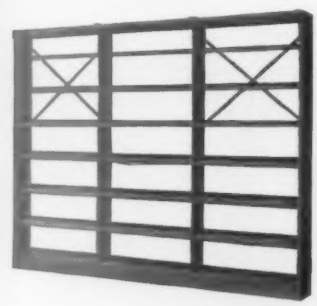
Attractive finishes, no weld marks, rust-proof bolts (none on fronts), concealed hinge-pins—these enhance the appearance of Terrell Lockers.

STEEL BOOK STACK UNITS

Here is modern steel book shelving in its best and simplest form—designed and built for the utmost in service for educational institutions.

Easily planned — easily installed—very reasonably priced.

Book Stack Units can serve you as efficiently as they are serving many other leading universities and schools.



SIMPLIFIED, MODERN STEEL BOOK SHELVING

Simplicity

Sold as units, no complicated parts to figure. Intermembering units (of varying widths if required), with duplicating parts omitted, match perfectly in building an assembly.

Sizes

Offered in an assortment of sizes—widths 30", 36", 42"—depths 9", 12"—heights 6′ 6", 7′ 6", 8′ 6".

Capacity

These Book Stacks will accommodate 10% more books than sectional glass door bookcases of the same height. Rounded front posts give maximum shelf width.

Flexibility

A combination of sizes for any space. Shelves adjustable every inch for books of any height. Easily and quickly rearranged.

Strength

The construction of upright posts, tops, bases and shelves insures strength and rigidity in every part. No sagging of shelves even under the heaviest load.

Protection

No rough bolts or raw edges of steel can come in contact with books or hands. Front edge of shelf is triple-flanged for added protection.

Beauty

Designed, built and finished to harmonize with the finest furnishings. The attractive cornice top adds a touch of conservative artistry to each unit.

PENN METAL CORPORATION OF PENNA.

46 Oregon Avenue, Philadelphia, Pa.

SALES OFFICES IN PRINCIPAL CITIES

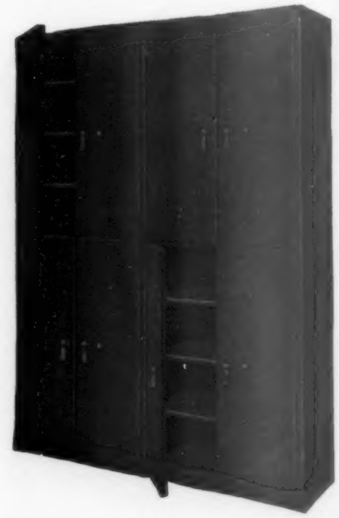
IN BUSINESS CONTINUOUSLY SINCE 1869

STEEL LOCKERS -- STORAGE and WARDROBE CABINETS STEEL SHELVING -- LOCKER ROOM BENCHES and BASKET RACKS

The Penco Combination Cabinet—Type 3618C, 36" wide, 18" deep and 78" high. Many other styles and sizes of cabinets available

PENCO STEEL PRODUCTS have been time-tested and demonstrated to be satisfactory in thousands of school, university, business and industrial installations.

There is a type of Locker for every school need. . . . Storage and Wardrobe Cabinets for shop, office and teachers' use. . . . Shelving for stock rooms, laboratories and shops.



Closed-Type Plain Shelving with Doors. Two units shown, each 36" wide, 12" deep and 8' 3" high. Other shelving combinations include — plain or ledge types, open or closed, with or without doors. Sizes and reinforcements for every purpose

The Penco Basket Rack—Built in convenient widths and heights to accommodate various quantities of baskets

Penco Two-Person Lockers are space savers. Group of three shown, each 15" wide, 21" deep and 72" high

In the manufacture of Penco equipment the best materials obtainable are combined with careful workmanship to produce strong, durable units of heavy gauge steel that are attractive in appearance and practical in design. You can specify and purchase these products with absolute confidence and assurance of satisfaction . . . they are guaranteed.

Penco engineers are able to point out economies in the selection of equipment, its layout and its use. This service is available without charge or obligation.

Write for further information and complete specifications

Catalog No. 45 Series E—Steel Shelving
Catalog No. 46 Series F—Lockers and Cabinets

The Penn-Joyce Tool Cabinet—Type 34-T, 24" wide, 16" deep and 36" high. Several other styles available

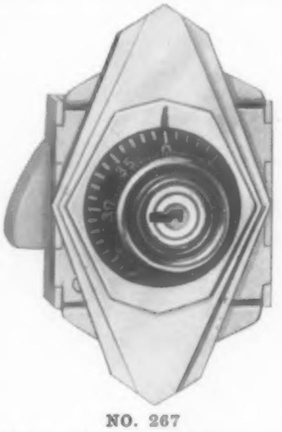
NATIONAL LOCK CO.

Rockford, Illinois

BRANCH OFFICES

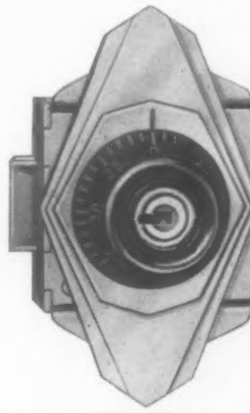
Chicago
Chattanooga
Cincinnati
Cleveland
Detroit
Evansville
Grand Rapids
High Point, N. C.
Houston
Indianapolis
Jamestown
Los Angeles
Martinsville, Va.
Milwaukee
New York
Portland
St. Louis
St. Paul
San Francisco
York, Pa.
Toronto, Ont.

ROCKFORD COMBINATION LOCKER LOCKS are available for standard Steel Lockers of any style or make. It is the complete line assuring the utmost in security, convenience, simplicity and durability. Rockford Locks have proven their worth in hundreds of Educational Institutions. For simplified and complete supervision and control select the Rockford Line.



NO. 267

Master Keyed Combination Self Locking, for use on Lockers having spring latch bar. Over 64,000 different combinations available. No bolt or rivet heads visible from outside. Can also be furnished without Master Key feature.



NO. 269

For use on Box type Lockers having no latch bar. Lock has beveled spring bolt. Closing door locks lock and spins dial concealing last figure of combination. Furnished with or without Master Key feature.

NO. 271

Master Keyed Combination Dead Bolt Lock having square end dead bolt. Lock does not have self-locking feature. Combinations of this lock and Nos. 267 and 269 can easily be changed by removing escutcheon plate and turning dial.

COMBINATION SHACKLE LOCKS

NO. 265

Keyless Combination Self-locking Shackle Lock that is fool proof, secure and durable. Inserting shackle upsets combination by turning dial. Must be completely re-dialed to open. Over 64,000 different combinations available. This is a very popular lock in the Rockford Line. Lock case is Chromium Plated and dial is black with white figures.

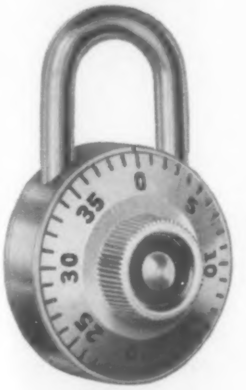
NO. 264

Master Keyed for ease and convenience of supervision. Can be Master Keyed with all built-in Locks shown above, or Laboratory Lock shown below. Students operate lock by combinations, while officials gain access by use of Master Key. Dial is locked against rotation when shackle is open.

NO. 275

COMBINATION SHACKLE LOCK

Where Locks are purchased by School authorities to be sold on a no-refund basis, this Lock is suggested. The finish is Baked Aluminum and Varnish, a very attractive item, and all mechanical parts of any importance are made of Brass. Parts requiring extra strength are made of Steel, Cadmium Plated and are completely rust-proof. The shackle is self-locking and there are over 64,000 combinations available. Dialing is ratchet or click type permitting rapid operation and the large numerals are easily read, even in dark corridors or locker rooms. This is a full-size Lock of special value and should be re-sold to the students at 10¢ to 25¢ more than the actual School cost.

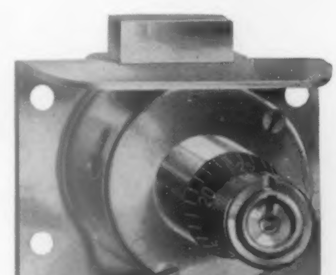


NO. 275

NO. 259

COMBINATION DRAWER LOCK

Combination Master Keyed Laboratory Drawer or Door Lock. Combination can quickly be changed without removing lock from mortise. Lock is of Solid Brass construction and is not affected by ordinary Laboratory fumes and acids. Lock is reversible for use on right or left hand doors.



NO. 259

Illustrated here are only a few of the many School Locks available in the Rockford Line. Ask for illustrated folder showing complete line.

DICTAPHONE CORPORATION

EDUCATIONAL DIVISION

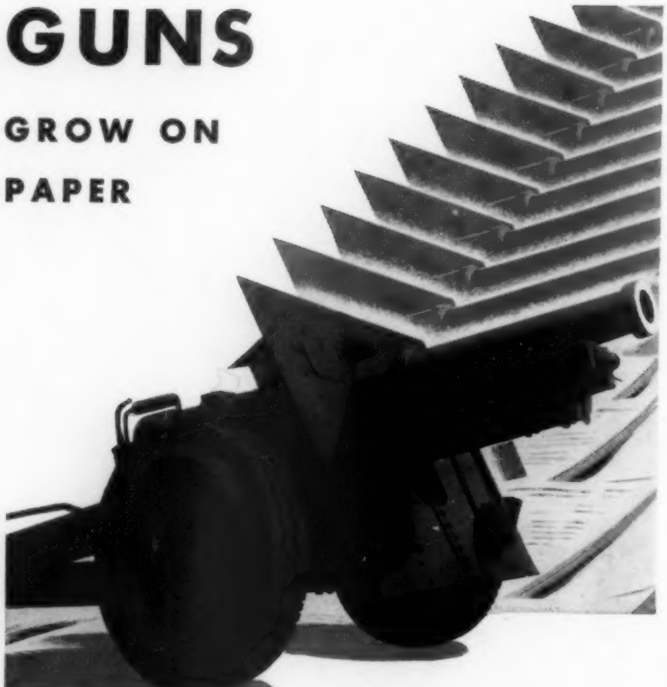
420 Lexington Avenue, New York City, N. Y.

National Defense calls for

GUNS

GROW ON

PAPER



Today, Dictaphone is as much a defense instrument as a lathe. And more Dictaphone-trained secretaries are needed than ever before!

A Dictaphone Business Practice room at one of the many progressive schools teaching this popular course.

Make your school an integral part of American Defense Plans

THE Dictaphone Business Practice Course enables you to train your students to take over responsible positions upon graduation...to be of real value to employers whose work must be kept moving at the rapid pace demanded by today's emergency.

DICTAPHONE BUSINESS PRACTICE AND TEACHING AIDS

A concise, 50-hour course, Dictaphone Business Practice (by Monk), is supplemented by many valuable, up-to-the-minute teaching aids.

This thorough program of vital teaching aids includes:

- Series of 18 Practice Records
- Tedens Minimum Fundamentals Test and Teacher's Key
- Individual Indication Slips
- Odell Minimum Essentials Test and Teacher's Key
- Transcription Error Charts
- Final Transcription Test
- Certificate of Proficiency in Leather Folding Case
- Student Employment Qualification Card
- Letterhead Pads
- Letter Writing Charts
- Speed and Accuracy Charts
- Personality Charts

DICTAPHONE CORPORATION

EDUCATIONAL DIVISION

420 Lexington Avenue, New York City, N. Y.

Dictaphone Trained Girls!

ALL students who pass the Final Transcription Test are awarded the Dictaphone *Certificate of Proficiency,* widely acknowledged by American businessmen as a dependable indication of exceptional ability.

The *Employment Qualification Card,* carefully outlining the capabilities, personality and grooming of each graduate, serves as an important link between graduate and prospective employer. It also assists the personnel managers of our country-wide chain of *free* employment offices to secure well-paying jobs more promptly for certified Dictaphone graduates.

The prospective employer recognizes the holder of a Dictaphone Certificate of Proficiency as an above-averaged trained girl, fully equipped to go to work.

Send TODAY for Complete Sample Portfolio of Free Teaching Aids! (No cost or obligation to you, of course.)

The Cameo model transcriber is easy to operate and Dictaphone's famous voice reproduction assures natural clarity. Dictaphone's many employment bureaus place, ***without charge,*** thousands of Dictaphone graduates in better paying positions every year.

Today's busy executive depends upon his Dictaphone and his Dictaphone-trained secretary to ***get things done.***

TRAINING A NECESSITY, NOW..."

EDIPHONE VOICE WRITING COURSE
COMPLETE...THOROUGH...EASILY ADAPTABLE

Free Teaching Material Included

Included, at no cost, in the course, "Ediphone Voice Writing and Integrated Studies," are such necessary school materials as:

Student's Text-Book . . . Teacher's Manual . . . Qualifying Tests . . . Full-length Practice Records . . . Letterhead Pads . . . Transcription Error Charts . . . Personality Rating Chart . . . Certificate of Proficiency.

AUTHORITATIVE — It is published by specialists in business education—South-Western Publishing Co. Not the work of an individual, but written by educational authorities (Kilduff, Goodfellow, Allen, Card and Copeland) this course is at once practical, functional, thorough.

THREE PHASES—Divided into three natural phases of instruction, "Ediphone Voice Writing and Integrated Studies" follows the step-by-step method of logic.

SPECIFIC — Each lesson has a specific objective — each has suitable typewriter drills. The course is completely indexed—well illustrated. The "why" of each direction is given. So clear that it is the *only* text that can be left with the student.

INTEGRATED—Throughout the course students are constantly reviewing other secretarial subjects—punctuation, syllabication, English, typing, etc.

TEACHER'S MANUAL—Provides a comprehensive Ediphone Voice Writing background. Tells the "what," "how" and "why" of classroom instruction.

Ask for a Proof Installation of The Ediphone—Investigate the complete course, "Ediphone Voice Writing and Integrated Studies." For full information simply write Dept. U42 Thomas A. Edison, Inc., West Orange, New Jersey, or Thomas A. Edison of Canada, Ltd., 610 Bay Street, Toronto.

EDIPHONES FOR SCHOOL ADMINISTRATIVE USE—Easy to use as a telephone, the new Ediphones will cut your letter-dictating time from 20% to 50%. Memos, notes, dates, instructions, ideas are recorded as you think of them—your mind freed for real administrative problems.

TEACH EDIPHONE VOICE WRITING

EDISON
VOICEWRITER
Ediphone

UNDERWOOD ELLIOTT FISHER COMPANY

Typewriters . . . Accounting Machines . . . Adding Machines . . . Carbon Paper . . . Ribbons . . . and other Supplies

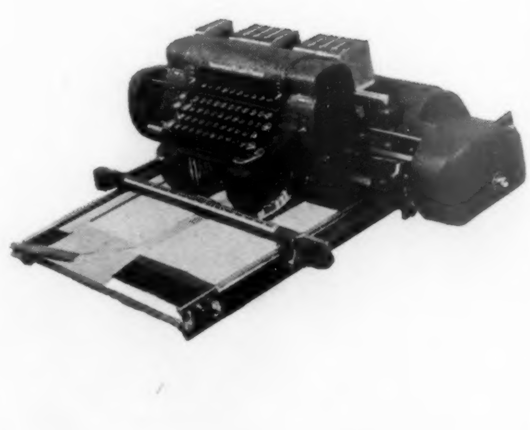
One Park Avenue, New York, N. Y.

COMPLETE SERVICE IN ALL PRINCIPAL CITIES

YOUR typewriters, because of the present emergency, have become more valuable than ever. Your typists do their best to keep them at top efficiency by proper cleaning. But the best possible conservation measure is to take advantage of the Underwood Maintenance Agreement. This provides for *regular inspection* of your machines. It is, in effect, an insurance policy covering the efficient operation of your typewriters. Ask us for details.

UEF

And better take good care of those Underwood Elliott Fisher Accounting Machines, too! It takes Uncle Sam's approval to get you a new one. Remember this one thing. There is someone in the Underwood Maintenance Department always at the other end of the 'phone.



Service Everywhere Through

A Nation-wide Organization

WHAT does this all add up to? Calling for Underwood Maintenance Service in time adds up to a heap of good sense . . . and helps your country. Today every Underwood Sundstrand Adding Machine is precious because it must be made to last longer. A Maintenance Agreement will do that and keep them in tip-top condition. And instruct your staff to call for Underwood service when any one of your machines gives less than its usual efficient performance.

Supplies, too, belong in your conservation program

Did you ever think of how important they are at a time like this? For instance, you want ribbons and carbon paper that give the clearest possible reproduction with longest possible wear. The answer is Underwood Elliott Fisher supplies. Who else should you turn to for such supplies, but the maker of the machines themselves?

UEF SUPERIOR SUPPLIES

1. Type Cleaner
2. Adding Machine Paper Rolls
3. Carbon Tally Rolls
4. Machine Oil
5. Ribbons
6. Brushes
7. Typewriter Pads
8. Carbon Paper
9. Carbon Paper Rolls
10. Cushion Keys

UNDERWOOD ELLIOTT FISHER COMPANY

Typewriters . . . Accounting Machines . . . Adding Machines . . . Carbon Paper . . . Ribbons . . . and other Supplies

One Park Avenue, New York, N. Y.

COMPLETE SERVICE IN ALL PRINCIPAL CITIES

THE YALE & TOWNE MFG. CO.

TRADE **YALE** MARK Stamford, Conn. TRADE **YALE** MARK

INTRODUCE true economies, maximum security and increased efficiency in locker rooms with these Yale Combination Locker Locks. They supply a degree of protection heretofore unavailable in locks of this type for locker use; security which discourages temptation, aiding in character development. Large easily read dials simplify operation, and minimize congestion and delay in locker rooms.

FOR ALL MAKES AND ALL TYPES OF STEEL LOCKERS

FOR NEW LOCKERS AND FOR REPLACEMENT OF WORN OUT LOCKS ON OLD EQUIPMENT

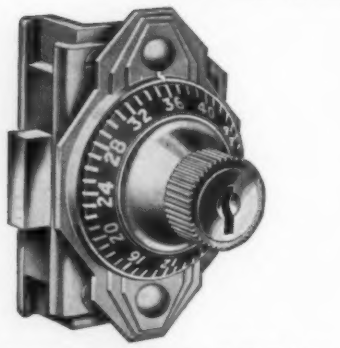
Exclusive Yale Features:

Maximum Security: Combinations dialed on three positive numbers. Combination must be known and cannot be located by manipulating dial.

Combination Disperser automatically upsets combination as lock is locked. A double safeguard. Acts as a defense against tampering.

Combination Changeable with every change of locker occupant—without removing lock from door. Feature secluded in back of lock in same secure manner as in Yale Bank Locks.

Supervisory Control of a group of lockers or the collective groups of a city school system obtained by the **Yale Emergency Key Control.** The key used is assigned exclusively to these locks.



For Lockers with Automatic Bolt Release Mechanism. Automatic Self-Locking Vertical Sliding Bolt. A New Locking Principle.

Emergency Key Controlled

No. L3374-CM, Cadmium finish
No. L3374-DZ, Chromium finish

Dial Operated Only

No. L3364-CM, Cadmium finish
No. L3364-DZ, Chromium finish

For Steel Compartment and Box Type Lockers. Beveled Spring-bolt, Automatic Self-Locking.

Dial Operated Only

No. L3369-CM, Cadmium finish
No. L3369-DZ, Chromium finish

Emergency Key Controlled

No. L3379-CM, Cadmium finish
No. L3379-DZ, Chromium finish

For Lockers with Gravity Type Locking Device. Dead Bolt Manually Operated.

Dial Operated Only

No. L3368-CM, Cadmium finish
No. L3368-DZ, Chromium finish

Emergency Key Controlled

No. L3378-CM, Cadmium finish
No. L3378-DZ, Chromium finish

NEW YALE COMBINATION PADLOCKS

FOR BASKET LOCKERS AND ALL OTHER TYPES AND MAKES OF STEEL LOCKERS

The finest and most secure combination padlocks yet produced

No. 589
Master-Key Controlled Dial

Same features of maximum security and automatic combination disperser as the above built-in type.

No. 579 Lock, Dial operation only.

No. 589 Lock, Dial operation with emergency key, provides supervisory control of lockers. May also be used with any of above built-in types under same control key.

These padlocks have ¼″ diameter steel shackles and the graduations and numerals on the black enameled dial are easily read.

No. 515 Lock, Dial operation only. A good secure medium priced padlock. The steel shackle is 9/32″ in diameter and the case of solid rustless metal is attractively finished in bright baked aluminum.

The Yale Rotating Dial provides fast accurate dialing.

The Combinations are unlimited on all above padlocks.

No. 515
Dial Operated Only

SECTION IX
CAFETERIA—HOME ECONOMICS—DORMITORY

EFFICIENT CAFETERIA AND KITCHEN LAYOUTS FOR COLLEGE RESIDENCE HALLS

By J. LESLIE ROLLINS

Director of Dormitories, Northwestern University

IT IS only in recent years that colleges have assumed real responsibility toward the patronage of their students in their dormitories and dining halls. The result of this awakening has been superior food and service. To accomplish this end, dining-hall managers have necessarily learned as much as possible about equipment and efficient arrangement thereof. However, no one individual, be he architect, kitchen engineer, or manager, is competent to plan an efficient kitchen layout. My own experience, after studying some 50 college dining halls, shows that where only one person arranged for the kitchen and cafeteria service, innumerable glaring errors were made. At the present time many commercial restaurants are spending a great deal of money, with the expert advice of kitchen engineers, to streamline their kitchen and cafeteria counters for improved service and reduced labor costs. Yet, too many dining-room managers in educational institutions still refuse to be educated in their own field.

Cooperation Essential

No one would undertake to design and build a large college dormitory without an architect, yet many will plan a complicated kitchen and cafeteria without the aid of a trained kitchen engineer. This technical advice is of value only to the dining-hall manager who appreciates his problems so fully that he can apply this skilled assistance to his own particular requirements.

If this short article accomplishes nothing else, let it emphasize the absolute necessity of complete cooperation between the architect of the building, a kitchen engineer, and the manager of the dining hall, in either a new or a remodeled kitchen layout.

Every layout is an absolutely individual problem. Consequently, no definite plan nor procedure can be set down to cover any and all needs. This article attempts only to give some of the information which will be helpful to anyone modernizing or originating a kitchen and cafeteria plan.

Proper Space

1. The first and most important step in connection with kitchen planning is the apportionment of good and sufficient square foot area.

2. Many kitchens are "unfit" even before they are started, owing to the lack of adequate space and, sometimes, to the setting aside of too much space.

3. When the space provided is not adequate, all the necessary equipment cannot be placed. On the other hand, when too much space is provided, there will be an impairment of utility due to too large aisles and too great a distance between the various departments.

4. Specifically, the floor area required for the food service should be just about the same as the area of the dining room. This is estimated at approximately 14 square feet per chair.

5. In this available area is included the space for the kitchen offices proper, the food preparation department, the pantry and the bake shop, the storeroom and receiving room and the refrigerators.

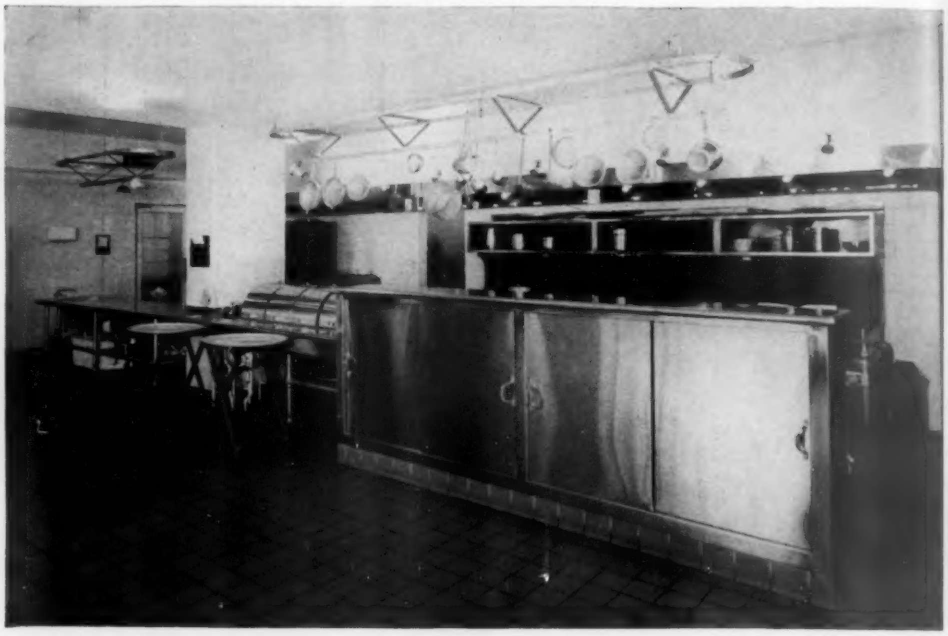
6. Too often, in planning the Residence Hall, no space is allotted to the kitchen until after the other sections of the house have been provided for with the result that an insufficient area is left for this purpose.

Selecting the Equipment

1. The available budget will materially affect the type of equipment selected.

2. The specifications for the equipment should be detailed and as exacting as possible. Square corners, joints, seams, etc., should be avoided.

3. Where it is at all possible, full advantage should be taken of non-corrodible metals (stainless steel or monel metal). The purchase of equipment in the non-corrodible metals, involves more expense for the



Section of Abbott Hall kitchen, Northwestern University, serving 2,800 meals a day.—Kitchen employees take pride in a beautiful, well-ordered kitchen, and this pride is reflected in their work and in the quality of food they display

original outlay but, over a period of years, is by far the most economical.

4. This type of equipment will last as long as the building itself. Stainless fixtures are non-corrodible; have lasting life; are less expensive to maintain.

5. The metals used and the type of construction, are of equal importance. Fixtures coming in direct contact with the foods, or dishes, are best fabricated of stainless steel or monel metal.

6. The kitchen employees take pride in a beautiful, well-ordered kitchen, and this pride is reflected in their work and the quality of food they display.

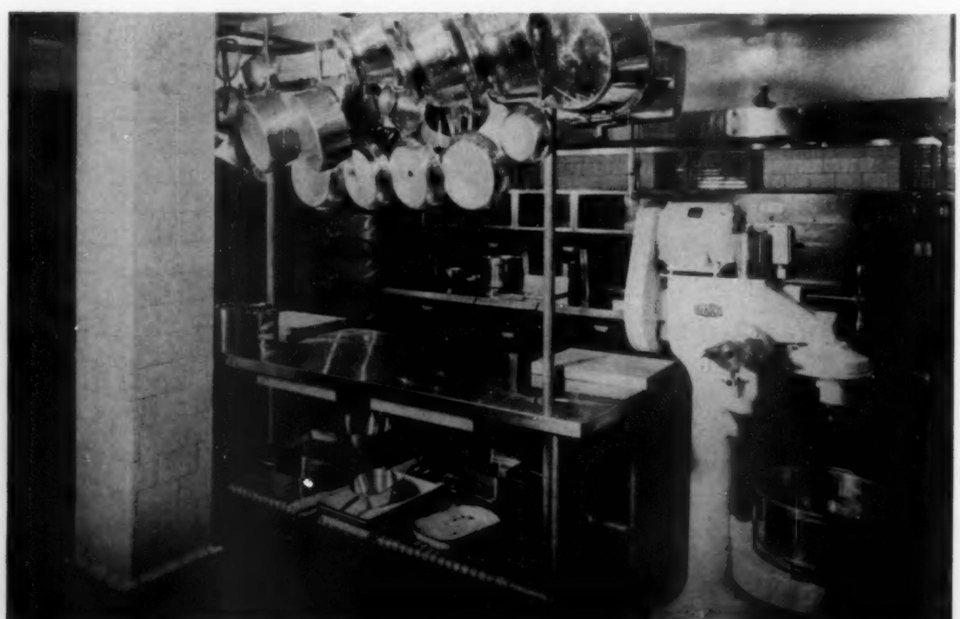
7. Tables should be ordered with rounded corners. The interiors of all sinks and dish tables should be coved. Riveted and hemmed seams should be avoided and welding specified throughout construction.

In the problem of selecting the proper manufacturers' equipment, a few statistics as to what can be produced from these may be of interest.

Each section of heavy-duty commercial range measures approximately 34 inches wide x 42 inches deep and has one oven, 24 x 23 x 16 inches high. One of these sections is required for each 150 to 200 persons.

On this basis, the kitchen will require two heavy-duty sections of range, supplemented by one 18-inch-deep fat fryer.

One broiling unit is necessary, this fixture to be a combination griddle and broiler which can be used for broiling, as well as for griddle work, for breakfast.



Small but completely electric kitchen at Willard Hall, Northwestern University, serving 1,200 meals a day.—The planning of an efficient kitchen layout calls for the complete cooperation of the dining hall manager, the architect, the kitchen engineer, the local utility company, and the various contractors

Section of the sinks in the vegetable room in Abbott Hall. —Fixtures coming in direct contact with the foods or dishes are best fabricated of stainless steel or monel metal

For every 200 persons, one soup and stock kettle is required. The most suitable size is the 40-gallon capacity, and the type selected should be the low type which facilitates cleaning and handling, rather than the old style deeper type.

For 400 persons, the kitchen would require two of these kettles. The kettles should be either aluminum or stainless steel, depending on which material is available.

One vegetable steamer, supplemented by the two kettles, should be adequate for vegetable work. This vegetable steamer should be the three-compartment type and have a capacity of approximately six bushels.

The type of steamer selected should have the latest improvements, stainless steel interior, automatic slide-out shelves, thermostatic controls and safety devices, making it impossible for the operator to become scalded by the steam.

One cereal cooker is desired. This fixture is constructed in the form of a double boiler and should be the type fitted with two 5-gallon insets, having a total capacity of 10 gallons at one time.

This equipment, together with a full complement of work tables, bake oven, mixers and sinks, provides an adequate arrangement for a kitchen serving up to 400 persons.

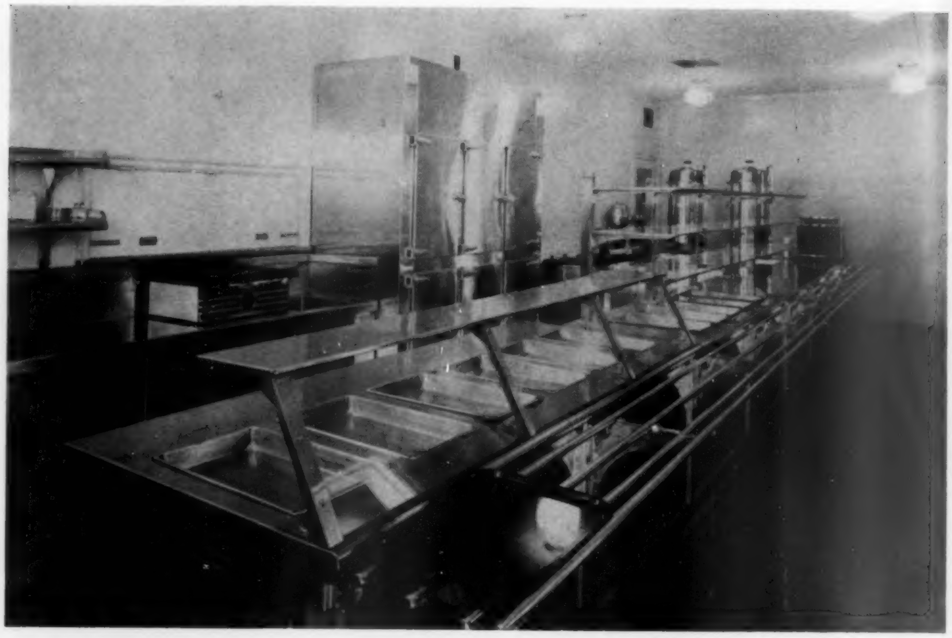
Two cafeteria counters, each approximately 30 feet long, are recommended. Counters of this size will very efficiently handle the traffic of 175 to 200 people.

A traffic line of 300 people can be handled in a longer cafeteria counter, 45 to 50 feet, but the arrangement is not as satisfactory as the two counters.

Each counter should be complete with a 6-foot-long electric hot table and a 4-foot-long salad unit.

The rest of the space is to be utilized for serving and for desserts.

Dish-washing room at Willard Hall includes conveyor type of dish-washing machine as well as glass washer.—The interiors of all sinks and dish tables should be coved. Riveted and hemmed seams should be avoided, and welding specified throughout construction



A cafeteria counter in the Abbott Hall dining room.—The advantages of cafeteria service are its lower operating cost and the greater satisfaction to the student in choice of dining schedule, menu, and companionship

Double-service coffee urns will be required; one for each counter unit.

To facilitate the serving of fresh chilled salads, a special prepared-salad storage refrigerator is essential.

No recommendation is made for the order of arrangement of the cafeteria counter, since this is a merchandising problem to be handled by the manager.

Proper consideration should be given to the selection of fuels. A meeting with the local utility company or companies is recommended before a decision is reached regarding the selection of gas or electricity as being the most suitable for the installation in question.

Storerooms

The storerooms should be of ample capacity and conveniently located. Generally, it is best to provide two storerooms; one for bulk storage and the other for daily usage.

There should be available a space not only for kitchen storage but for linens, special banquet supplies and reserve china, glass and silver, etc.

Too little space is often provided for refrigeration. Separate walk-in refrigerator compartments should be provided for meats, dairy products and vegetables.

In addition to the main refrigerator plant, there should be provided individual refrigerators for the bake shop, pantry, salad preparation, and chef. A separate refrigerator for the refuse should not be overlooked.

The cooperation of the plumbing contractor, steamfitter and ventilating contractor is important to the appearance and efficiency of the kitchen.

A dimensioned, detailed plan should be given to the various contractors, indicating all the connections required.

Completely electric cafeteria serving counter at Willard Hall. —The cafeteria counter is completely outside the dining room. This arrangement serves a twofold purpose: it preserves a certain amount of quiet in the dining room and permits service at dinner by waiters

Courtesy of The Hotel Monthly

This will insure the streamlining of all connections and avoid the unsightly appearance caused by connection outlets that are too far removed from the respective fixtures.

Chrome-plated piping and fittings should be specified on all stainless steel equipment.

The ventilation of the kitchen is of major importance. The heat and fumes must be carried off as rapidly as they are generated. This should be planned in advance so that all ducts are concealed in the walls and in the ceilings, for both appearance and sanitation.

A sound-deadening ceiling, and flooring that is skid-proof and resilient, should be selected.

Cafeteria service has been installed wherever possible in Northwestern University's dining halls. This has been done to afford advantages which table service with student help cannot give. Obviously, operation costs are lower; thus the profit to the school. To the student, there is the profit of enjoying his meals at his convenience, of selecting from an attractively displayed and varied menu, and of selecting his own companions. In an experimental cafeteria the leisurely enjoyment of all meals, and the general satisfaction with them, was increased immediately in proportion to choice of time, menu and companionship.

In the old days when a bell rang, a line formed, a door was opened and 150 young people seated themselves simultaneously in assigned places; there was the enforced orderliness of a small concentration camp. The general tone of the conversation was—"Spanish rice again!" and "Of course, it's Thursday." Today, when a student chooses from a generous menu, he has only himself to blame if he dislikes his selection. He may now breakfast from 7:30 to 9:30, lunch from 11:30 to 1:30, and dine from 5:30 to 7:00, as suits his convenience and his classroom schedule. His average number of hours in class are four per day, and in pre-cafeteria years his average in the dining room was sometimes only one hour for his three meals. Today under this new and more desirable arrangement, one hour per meal is more probable. In an educational institution, these three hours are of value for more than pure bodily sustenance. They constitute a definite period of social intercourse under relaxing conditions, a sphere of development not to be overlooked by any means.

These conditions can exist only when a certain amount of quiet can be maintained in the dining room proper. To this end, it is highly advisable to have the cafeteria counters and line completely outside the dining room. Where, as Northwestern dining halls do, the dinner service is table service, such an arrangement is essential. Though the dinner hour is an extended one, the service by waiters lends a pleasant note of formality to the concluding meal of the day.

Dining rooms built to enable complete separation of units are undisturbed alike by cafeteria counter or other parties in the large room.

Courtesy of The Hotel Monthly

Corner of the Willard Hall dining room.—Swedish modern furniture and white china decorated with a motif of the wall paper create a pleasant, informal atmosphere conducive to a leisurely meal

In a college which operates a vigorous summer program of school or groups, the cafeteria layout is a vast saving. Student help is often difficult to obtain, and a la carte meals cannot be served economically, if at all, with table service. As a result, the cafeteria counter, whether used as such, or as a service counter to waiters, is far the most adjustable and satisfactory the year around.

Making the dining room, as well as the service counter, attractive is imperative. Luckily, a limited budget *does not* always govern this; for imagination and resourcefulness will do more to help this than a bountiful budget. The more use of stainless metals on the cafeteria counters, the better. With the new non-gloss and durable enamels a cafeteria counter front can be made to look most attractive at a low cost. All this is nothing more than a background for the interesting food to be displayed.

The dining room itself must be pleasant, quiet, and in every way conducive to a leisurely meal. The furniture should have definite design, for comfortable seating as well as eye appeal. Years of study have been given to the size of table best suited to group conversation. Our experience has been that a table

for six (36 x 60 inches) with two at one side and one at each end gives more possibilities for including each person in the conversation. Three at a side for a table of six did not give the same results. At a table seating a larger group, the conversation can never be as general nor as intimate. Tables of four have definite limitations, however, for the utilization of floor space. It is wise to insert a few of these and an occasional round table, as well as one or two for eight.

Of importance is an acoustical tile ceiling to make as quiet a room as possible. For wall coverings, there are to be had good, washable papers; papers that can be washed with soap and water innumerable times for several years. However, a periodic change of interior decoration is most desirable, and the size of one's budget must determine the cost of the decorating.

For floor coverings, many possibilities exist. Again, this is a matter of budgetary consideration. Colorful asphalt tile is recommended, as not only the cheapest, but as an absolutely satisfactory flooring material.

Every cafeteria and cafeteria counter can be laid out from a purely mathematical and scientific point of view. Every piece of equipment has a maximum use to which it can be put. Every cafeteria counter can be analyzed to the exact number of people, depending on the type of menu used, that can be put through in a given length of time, as well as the steps required by employees. All this can be worked out before the actual operation begins.

There is practically nothing at all that need be left to guesswork. If only the cafeteria manager will study these problems from this point of view, with the aid of his kitchen engineer, and of the architect of the building,—may I repeat again—it would be next to impossible to make many errors.

PLANNING HOMEMAKING DEPARTMENTS

By FRANK WILLIAMS

Director, Division of Schoolhouse Planning, Oklahoma State Department of Public Instruction

DURING the last few years a large percentage of the time of the Division of Schoolhouse Planning of the Oklahoma State Board of Education has been spent in conference with the homemaking supervisors or in the preparation of plans and specifications for the construction of homemaking units. The problems in several sections of the state are so different that as far as possible each job is considered a unit, and an individual solution is provided for each. In the eastern side of the state, which has mines, sawmills, and cut-over timber lands, the local district, owing to lower assessed valuation, cannot provide as much revenue as in better farming communities and in the oil section. However, in the poorer east side of the state there is an abundance of native building materials which help to offset the inability of the district to raise as much cash as school districts in other parts of the state.

Effective Cooperation

When possible, a member of the Division of Schoolhouse Planning makes a trip to the school district and advises with the local school authorities in regard to the best place to house the homemaking division. Some departments are housed in cottages, some in remodeled rooms in the present building, and some in the new building, to house all of the school. There has been the closest cooperation between the local boards of education, their superintendents, and the employees of the State Board of Education.

Oklahoma now has four homemaking supervisors for the white schools and one for the colored. These supervisors are constantly on the job, studying work already done and revising plans, as well as working on plans for new departments.

Owing to the limited personnel in the Schoolhouse Planning Division, each supervisor has developed into a "draftsman." The supervisors are called upon to measure rooms to be remodeled, locate all doors, windows, radiators, etc. It is also necessary to learn how the project is to be financed. Then with the aid of cross-section paper and a straightedge they make sketches not only of the floor plans but also of all cabinets, drawn to approximate scale. The two divisions—Homemaking, and Schoolhouse Planning—then discuss and develop these sketches. New ideas are constantly being developed. This service is given all architects and school people requesting it.

When remodeling existing rooms for homemaking departments or providing new space, the teachers, pupils, superintendent, and local board of education are asked to assist in the planning, to try to make the program fit their needs as nearly as possible, as well as to make them feel that each has had a part in planning the program.

Making Best Use of Available Space

Not all departments are housed in cottages. In fact, when the school is constructing an entirely new building, the homemaking department is housed in that building. Also, when there is sufficient room in the present building for the homemaking department to be added, it is housed in the main building. In many cases, however, the present building becomes crowded and the regular academic class work may be conducted in the present rooms to greater advantage than the homemaking. This is especially true if the building is old and it is not advisable to plan an addition. It is then recommended that the homemaking department be removed from the main building and housed in a cottage.

Work areas are also a factor studied. The space requirements are practically the same, as a general rule. Workrooms should be a minimum of 23 feet in width to allow ample space for two work units in the food-preparation end of the room. With this width the refrigerator may be placed in the center with a food preparation unit on each side. If the room is less than 23 feet in width, this arrangement will not be satisfactory. If given enough room, even though it is odd-shaped, a satisfactory arrangement can usually be worked out. It is better to place the stoves at opposite sides of the room rather than back to back in front of the refrigerator.

Selection of Equipment

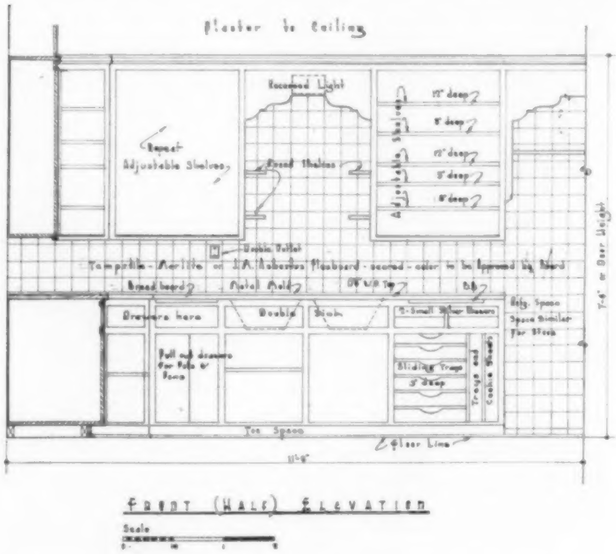
The hardware is usually selected for each individual job. Now that there are so many different selections in hardware, especially the drawer- and door-pulls, the selection of most of these items is left to the local teacher and board, with the advice of the homemaking supervisors or the Schoolhouse Planning Division.

It is desirable to have the floor of the main workroom covered with inlaid linoleum or a composition tile. If tile is used, a careful check should be made with the manufacturer to see that the tile is recom-

mended for use where grease may be spilled on the floor.

Fireplaces, bookcases, work tables, cabinets, individual tote trays, portable blackboards, bulletin boards and screens are all detailed. By placing a blackboard on one side of the screen and the bulletin board on the other side, one piece of furniture may be made to serve a multiple purpose. Many of these are being built in the shops of the National Youth Administration. Others are constructed on the job by the regular carpenters.

Space is provided for letter files for the teacher, and large sliding shelves for storage of posters and other illustrative material, and also for linen. (See Fig. B.) All this helps to hold the size of the building to a minimum, which in many cases is essential because of lack of funds. At the same time there is a place provided for the storage of all necessary equipment, as well as ample working space. As a general rule, bedrooms are not provided. They are desirable when the district can afford them. For teaching purposes a folding roll-a-way bed may be used. It will cost little, will take up little space, and when not in use may be stored. The same economy is practiced in selection of laundry equipment. Built-in tubs are expensive and hard to work around, whereas, two regular tubs on a rack mounted on casters may be moved to any part of the room and thus be more accessible. They are also more economical and may be stored in a cabinet to provide a much neater appearance of the room when not in use. As a general rule, bathtubs are not recommended for these departments, though some communities want them.

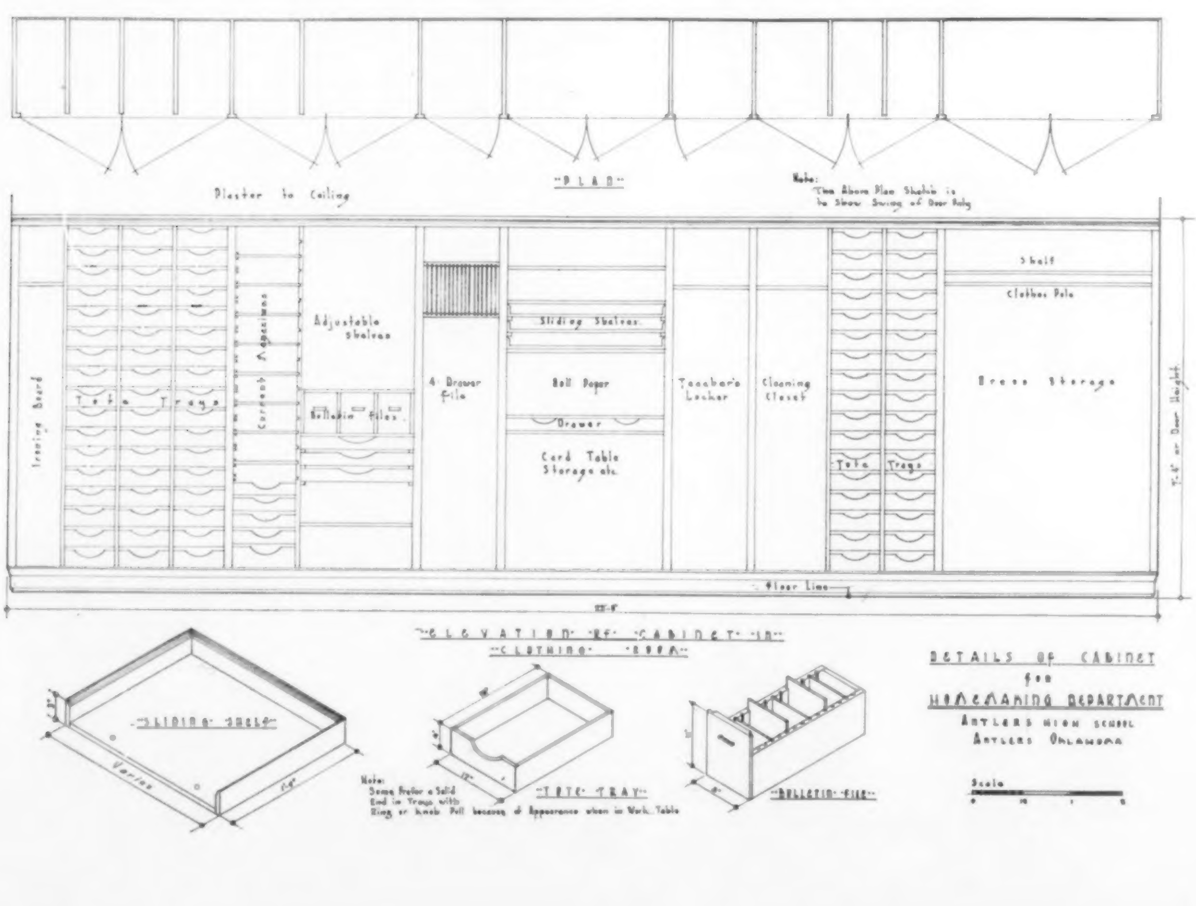


Above—Figure A. Elevation of cabinet in foods room

Below—Figure B. Elevation of cabinet in clothing room

Cabinet Design

All cabinets are detailed. Isometric drawings are made of some parts to help all concerned understand what is to be constructed. Since it is almost impos-



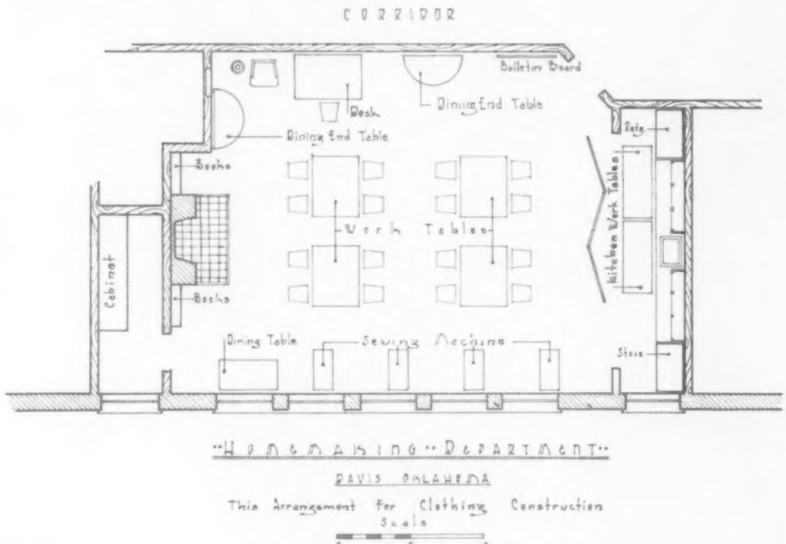
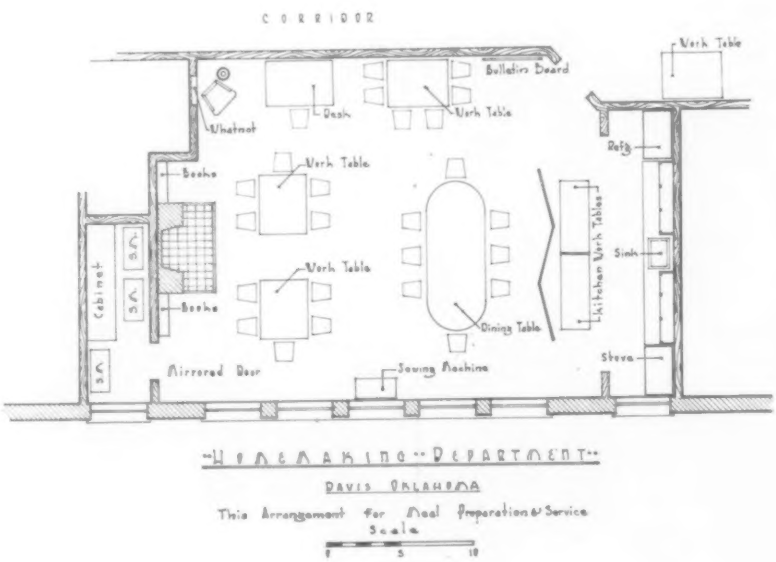


Fig. 3—With this arrangement each girl has access to her tote tray which has been brought from the storage cabinet, in this plan located in the closet, and placed in the ends of the work table. Considerable time is thus saved by having materials accessible



Remodeled Homemaking Room at Davis, Oklahoma

This is an excellent example of what can be done with limited funds. The total cost, including the remodeling of the room, stoves, refrigerator, curtains and drapes, cooking utensils, laying salvaged maple flooring, and all furniture was less than $1,000 for the school district. N. Y. A. labor was used to construct most of the furniture

Fig. 1 (above)—By carefully choosing multiple-purpose furniture the department can be made more home-like. The pupils are taught more than "cooking and sewing." More space would be desirable but this furnishes excellent opportunities for teaching

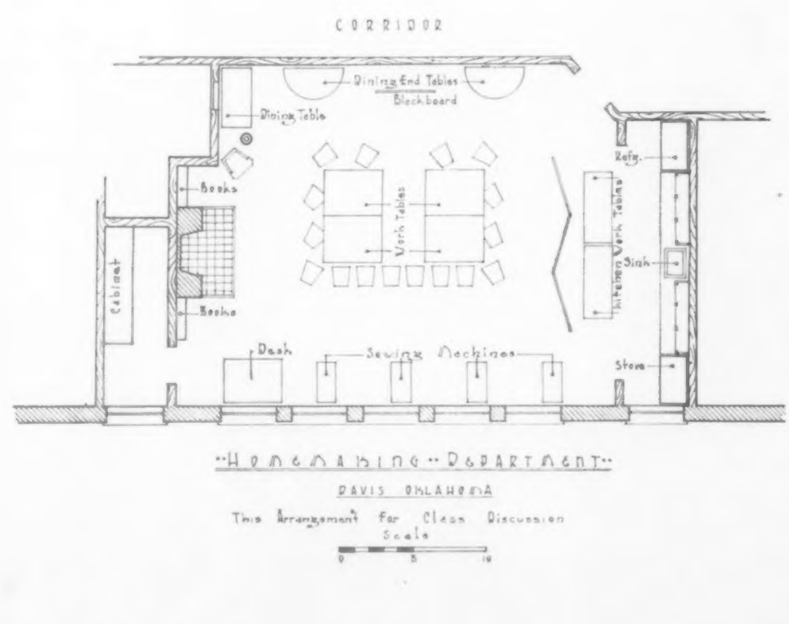
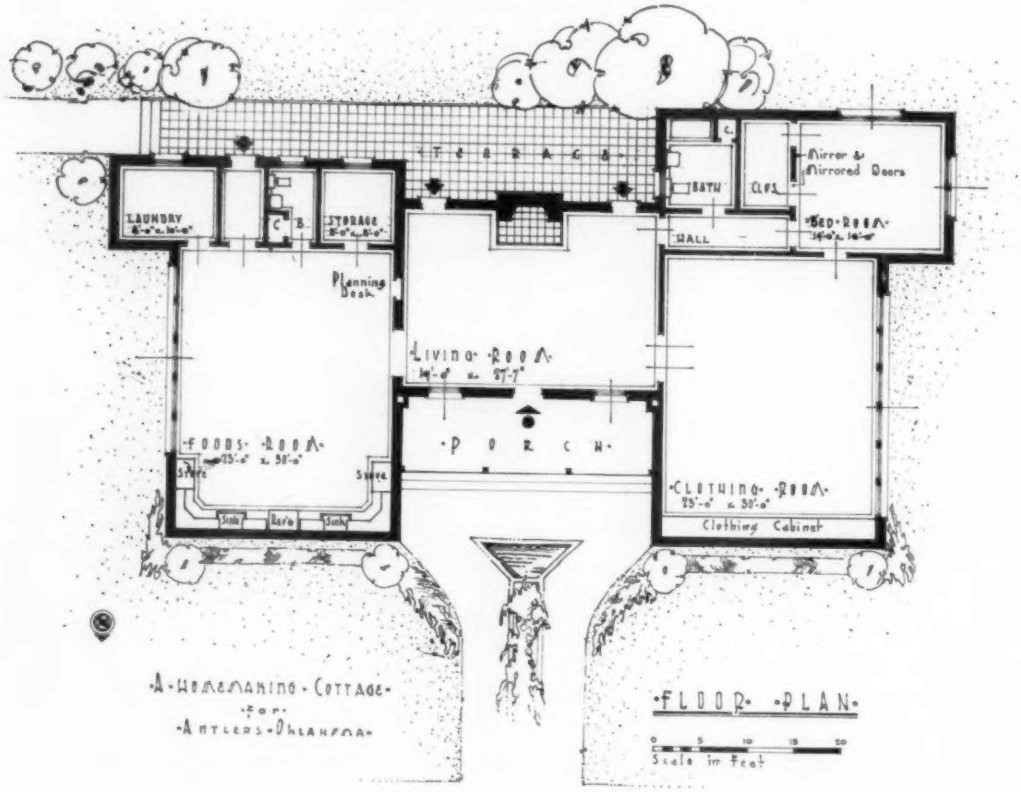


Fig. 2 (right)—The portable bulletin board has been turned to use the blackboard on the reverse side. With a few minutes spent in arrangement all can be comfortably seated where each can see. This is conducive to better discipline and good teaching



Left and below—Plan and front view of a homemaking cottage at Antlers, Oklahoma, built as a W.P.A. project at a cost of $10,000. Exterior walls are stone veneer on frame salvaged from an old building; interior partitions, wood lath and plaster on 2- x 4-inch studs; floors, yellow pine; ceilings in the workroom, one-half inch insulation board; in the other rooms, plaster on metal lath. A wood-burning fireplace heats the living room; butane gas, the other rooms. Height of the workrooms from floor to ceiling is 12 feet

sible to use the wall for a back and have a mouse-proof cabinet, ¼-inch 3-ply is specified for the back of all cabinets. Units of the kitchen cabinets are constantly being revised to save time and effort in the preparation of food and handling of utensils. The supervisors measure all the utensils before providing space for storage, and then to provide still additional flexibility metal stripping for adjustable shelves is specified for the cabinets. Many of the suggested changes come from the teachers with whom the supervisors are in contact constantly.

The tables for the main workroom are the result of a cooperative design problem. The tote trays, which the girls use for lockers, have been designed so that they will fit into the ends of the tables. Two trays fit in each end of the table. Four girls may be seated at the sides of each table, and thus each girl will have an individual tray containing the material with which she is to work. (See Fig. B showing storage space for tote trays when not in use.)

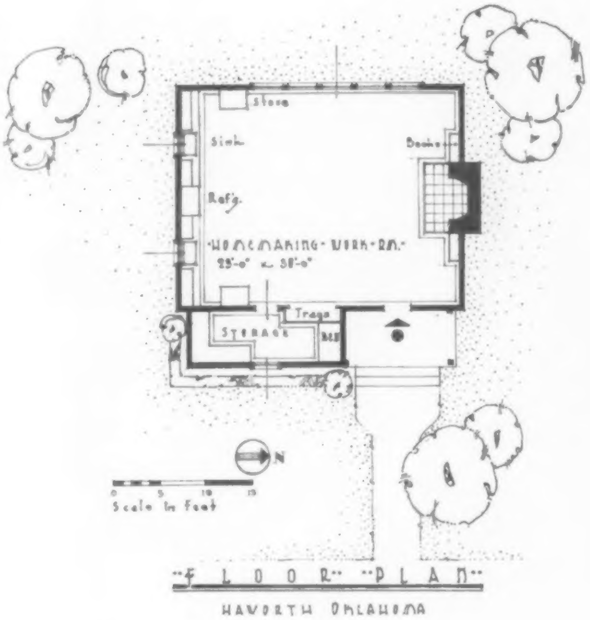
All cabinet work, with the exception of the drain boards, should receive three coats of enamel. The drain boards are constructed of 1⅛-inch white pine and then finished with clear varnish, covered with linoleum, or given four coats of gymnasium floor finish, which is a bakelite product. Some teachers report that drain boards to which four coats of gymnasium floor finish have been applied look like new after a year of hard service. Hot water and hot dishes placed on this working surface do not mar its

beauty. The supervisors or members of the schoolhouse planning division meet with the shop foreman or carpenter and discuss the plans, and then occasionally make return visits to inspect the work in progress. In this way it is easier to get a good job of construction and to satisfactorily work out possible changes.

The Carr City Cottage

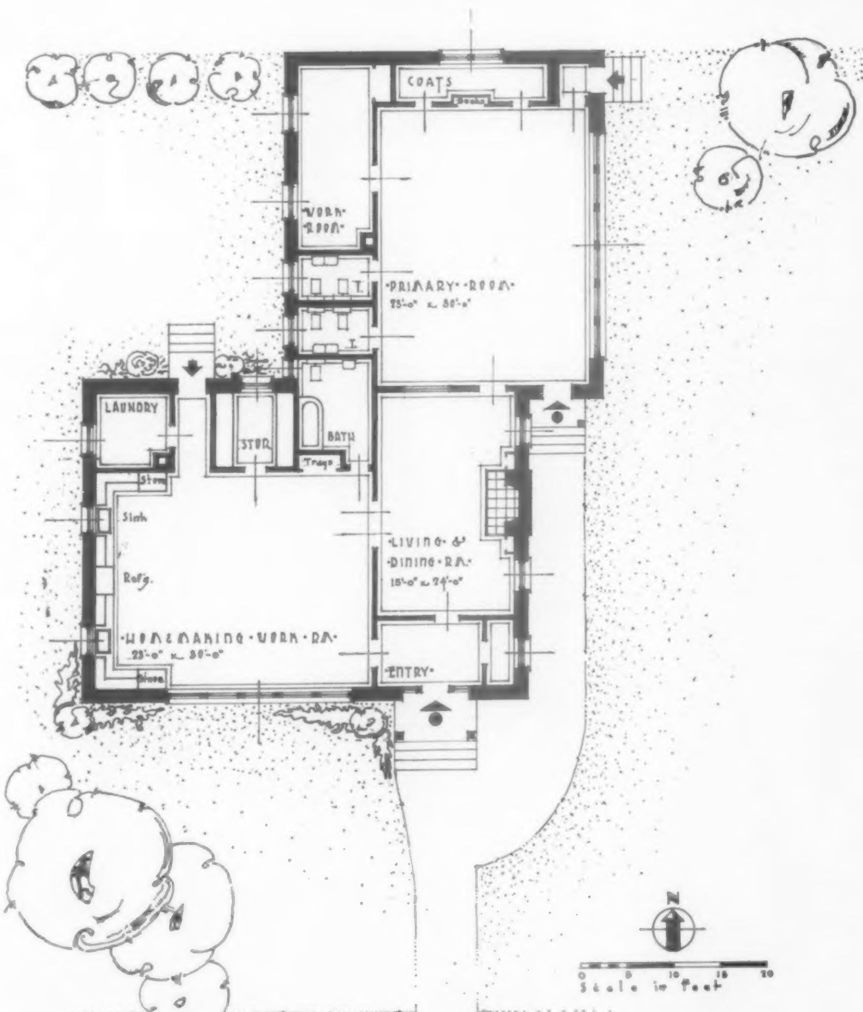
Carr City, District Number 25, Seminole County, Okla., is in the heart of the famous Seminole oil field. Several of the illustrations are from the cottage constructed in this district. The Carr City cottage is a typical one-teacher department, except that it has a primary room in connection. A primary room was needed at the same time that the homemaking unit was to be constructed. Since this was to be a Work Projects Administration project, it was decided to construct both departments under one roof. If they were separate, the district might get only one. It is

also desirable for the homemaking teacher and pupils to have contact with the smaller pupils and their mothers and thus make the department as homelike as possible. Several different sketches were prepared. It was decided that the one shown here was the best



Above—Total cost of this building to the school district was only $1200. Some of the cost of the lumber was borne by the local sawmill companies. The structure is frame; interior walls and ceiling, car siding (knotty) finished with clear varnish; floors, yellow pine; height of workroom from floor to ceiling, 12 feet. The workroom should be at least 5 feet longer. It is too small to include a fireplace

Photo—Front view of the Carr City cottage constructed as a W.P.A. project. The housing of the primary room together with the homemaking unit is an unusual feature; the contact with the smaller pupils and their mothers, which this arrangement provides, makes the homemaking department more homelike



Right—The exterior walls of the Carr City cottage are stone; the interior walls, wood lath and plaster on 2- x 4-inch studs; floors, yellow pine; ceilings, one-half inch insulation board; heating, natural gas; height from floor to ceiling, 12 feet. In the bath, laundry, and toilets, the floors are covered with linoleum; the ceilings, plastered

The care with which shelves are designed and adjusted to fit the utensils to be stored is shown in this picture of the cabinet unit in the Carr City cottage

solution to the problem. An observation screen was placed between the living-room and the primary room.

During the school year the homemaking department usually serves one or two banquets. When possible, some space adjacent to the homemaking department is made available for such service. Since the primary room in the Carr City plan is equipped with primary tables and chairs, which may be easily stored in the workroom, a banquet may be served in the primary room. This arrangement will be awkward, since it will be necessary to carry the food through the living-dining room. However, in laying out the plan it was thought best to arrange the building for the routine everyday duties rather than as one to be used once or twice a year. There are on the market large folding tables which may be used when serving banquets, also for extra cutting tables in the sewing classes. These are easily stored in a closet. The district did not have sufficient money to finish the building completely at first. The Work Projects Administration did an excellent job on the stone work and in fact on all the work of getting the building enclosed. Much of the interior was left for the district to complete when more funds were available. The building is now complete, and many of the furnishings have been provided.

As yet a number of high schools are not offering this program, the chief reason being lack of funds, but the number of requests for help on projects of this kind has increased several hundred per cent during the last few years. As a result, the Homemaking Department and Schoolhouse Planning Division do not have sufficient personnel to meet the demands made on them by the school people since the additional enthusiasm for this program.

THE COMBINATION PLAYROOM-LUNCHROOM FOR ELEMENTARY SCHOOLS

By

LAWSON A. WILES
Director, Department of Budget and Lunchrooms

and

GEORGE L. W. SCHULZ
Director, Department of Building and Grounds

Board of Education, City of Detroit

EDUCATIONAL authorities are becoming more and more aware of the importance of the noon lunch in the school program of growing children. Balanced diets and vitamins are receiving recognition as essential requirements in the health and educational training of school children. Consolidations and shifting population have made it necessary for many pupils to travel distances to school which would have been considered impossible not many years ago. At the same time, crowded conditions, arising from inability to finance needed school buildings, have created long school days and double sessions, and have placed a premium on room space in all schools.

Full-Time Space Utilization

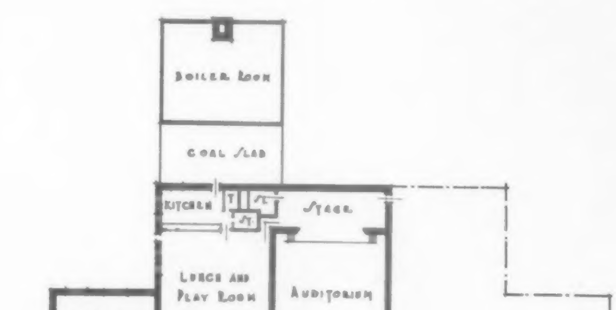
The limited use made of the lunchroom in an elementary school, compared with the use made of other rooms in the same building, has made this space very expensive. In an attempt to solve this problem, the Detroit Board of Education originated the playroom-lunchroom, a combination which allows full-time use of most of the space formerly used for the lunchroom only. This design of space use is adaptable for the rural community as well as for the growing city school district.

The first building completed from this design was occupied in 1929, and the experiences in its operation have resulted in the present plan, of which the Crary Elementary School, first occupied in April, 1941, is typical. The folding tables in the original unit were found to be difficult to operate, requiring an excessive amount of the janitor's time in the preparation of the room for class or lunch service. The arrangement for traffic movement in the layout needed study, and the present design is the best solution we have worked out so far.

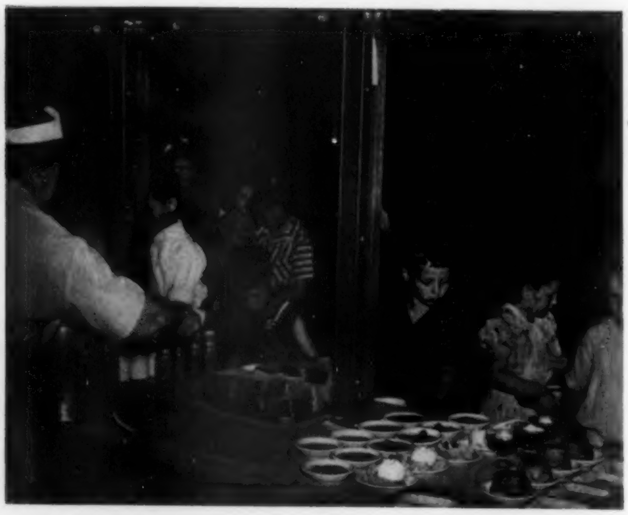
The location of the unit is important, since it must serve a dual purpose. In determining the location for lunchroom use, accessibility for deliveries should be considered carefully. The location for use in the instructional program may not require quite so much consideration, although a door leading directly to the playground is desirable.

The first-floor plan of the Crary School shows the location of the unit as designed to meet both the instructional and the auxiliary use. Location on the first floor, with an entrance to the kitchen direct from the service area, makes it possible to service the lunchroom without disturbing class instruction, and facilitates deliveries. The room is readily accessible from all parts of the main corridor and from the stairs leading from the second floor. With the completion of the proposed addition, the location will have few objections from the viewpoint of traffic movement.

It is to be noted, also, that the room has two exits in addition to the double entrance from the corridor. One entrance leads directly to the playground, and the other to the auditorium by way of the stage. The playground exit may be used to empty the room at lunch time or to allow a class to go directly to the playground as a part of the instructional program. In inclement weather, the room may be emptied into the auditorium, or, if the program is so arranged, the traffic may be routed to the auditorium at all times, leaving the corridor entrance for incoming pupils.



The first-floor plan of the Isaac Crary School shows the location and layout of the lunch and play room and its easy accessibility for all needs



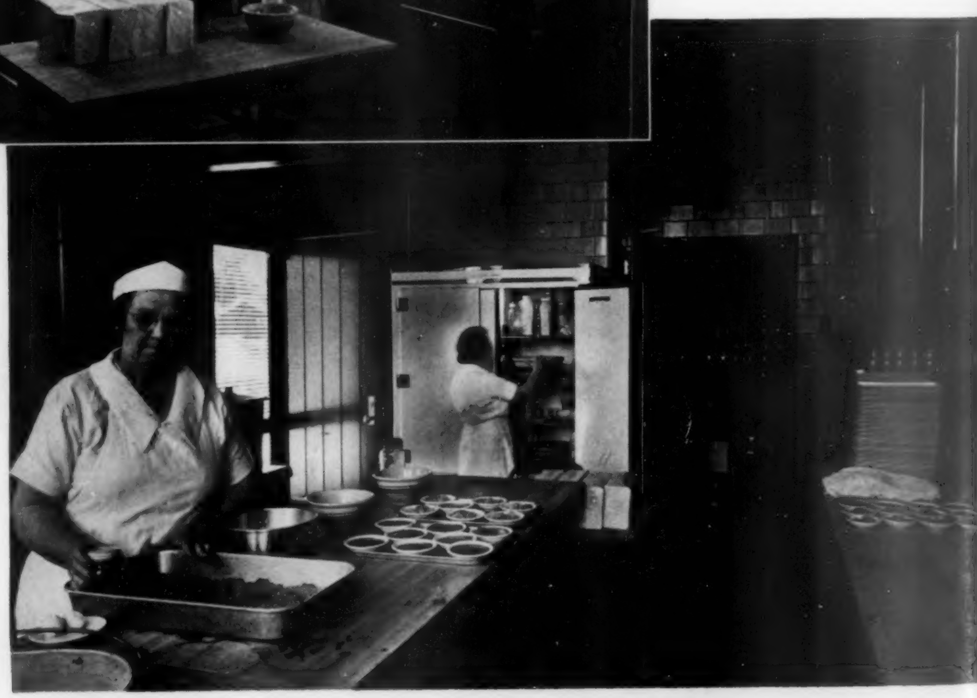
The service counter is on the kitchen side of a partition containing five movable panels that are raised when lunch is served. Four of the openings are used for food service; the last is used for soiled dishes

The partition between the main room and the kitchen contains five movable panels which are raised when lunch is served. On the kitchen side is the service counter serving four of the openings. The last panel is used for disposal of soiled dishes. On the room side of the partition a hinged tray-slide is located. During the use of the space as a playroom, the slide is lowered, leaving no projection in the playroom area.

The Playroom or Gymnasium

When used for instructional purposes, the playroom appears as a room used only as a gymnasium. The panels in the partition are lowered and locked in that position. The tables and benches are collapsed and recessed in the wall to leave an unobstructed room. Preparation of the noon lunch can go on during the class instruction, thus leaving the playroom available for instructional purposes.

The light and airy kitchen serves approximately 400 students and teachers



The kitchen contains a two-unit range, a dish-washing machine, a mechanical refrigerator, and the necessary small equipment and utensils

Above—Lunch hour in the Crary School lunch and play room

Below—A gymnasium class in the Crary School lunch and play room

Left—The lunchroom tables and benches when not in use are securely locked in a recess flush with the wall. It takes only ten minutes to put them into place

Below—Pupils lunching at one of the folding table and bench units in the Crary School playroom-lunchroom

The Lunchroom

When used as a lunchroom, the room appears as a commodious cafeteria. The panels in the partition are raised and locked in the open position, making accessible the food which is displayed on the counter. The tray-slide is in position, and the tables and benches are lowered.

The kitchen in the Crary School is a light, airy room, large enough for the preparation of food to serve approximately 400 students and teachers. The kitchen is well, but not elaborately, equipped, and contains a two-unit range, a dishwashing machine, a mechanical refrigerator, and the necessary small equipment and utensils. A well-ventilated storeroom is provided and a room for use of the employees, containing lockers and lavatory.

Tables and Benches

When working out the plan for the combination room, one of the obstacles was the invention of some means of rapidly converting the room from a classroom to a lunchroom, and, after the lunch period, of returning it to a classroom. The folding table was the first equipment designed for this purpose. The original tables were crude, and it soon was apparent that they took too long a time to operate. The present table is the result of continued study on the part of the staff, the school administration, and the manufacturers.

In the original layout, and for some time in other schools, the seating was by means of stools, which were stored in a room provided for that purpose when they were not in use. This arrangement was not satisfactory, since the time consumed in seating the room and storing the stools after the lunch period was too great, and the stool breakage was heavy. The folding bench was designed to answer these objections. Both table and bench fold into the wall in a recess flush with the wall, and are securely locked in that position until needed. When they are needed, the janitor unlocks and lowers them into position. The lowering of the tables and benches at the Crary School requires about ten minutes. An equal amount of time is required to return them to their original positions.

A Satisfactory Arrangement

The combination playroom-lunchroom as typified in the Crary Elementary School makes possible the full-time use of building space. The saving in cost is easily determined, since the same requirements are met with fewer rooms. The tables and benches are so constructed that they can be used when modernizing present buildings. The unit is well suited for community use as well as for school purposes.

A LOW-COST RESIDENCE HALL FOR MEN

By

MELLENBROOK, FOLEY AND SCOTT
Architects, Berea, Ohio

and

PAUL R. TRAUTMAN
Business Manager, Baldwin-Wallace College

WHEN plans were being made for the construction of Merner-Pfeiffer Hall, a dormitory for men at Baldwin-Wallace College, consideration was given to the fact that there was only one available practical site for the location of another dormitory for men, that there was a demand for a definite type of housing, and that the building be constructed in such a manner as to provide as long a life of service as possible with the lowest possible maintenance cost consistent with the funds available.

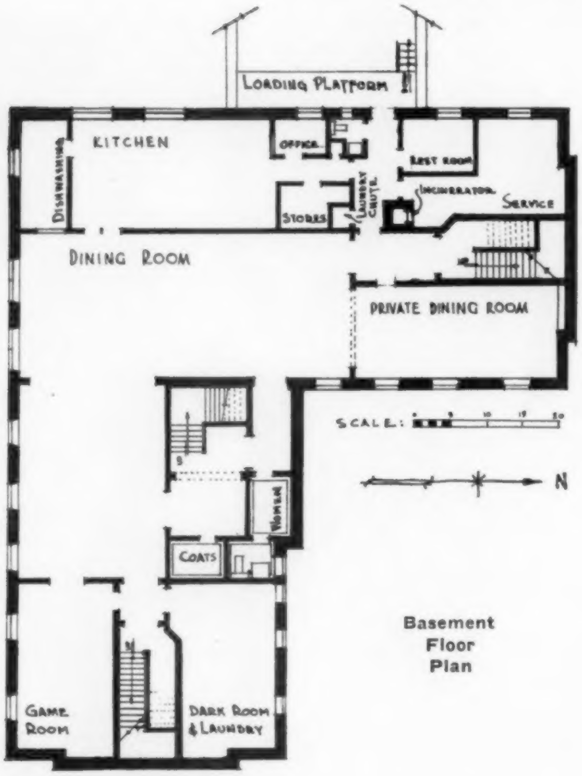
Exterior Design

The first problem confronting the architects was to fit the building to the site and to select a type of architecture that would blend into the surroundings. The nature of the site and the shape of the adjoining dormitory demanded that an L-shaped building be designed. A residential adaptation of the existing type of architecture of the near-by buildings was employed to blend this building into the campus. With simplicity of exterior design, this objective was pleasingly and impressively obtained. The exterior walls are of brick, with an appearance approaching that of hand-made bricks, with colors ranging from light-red and pink to a gray-green. The result is a softly colored wall with the effect of a piece of old tapestry. Indiana limestone trim and natural finish oak window frames give the exterior a clean-cut and neat appearance in conformity with the best type of residential architecture. A sandstone paved terrace enclosed with a brick and stone wall is provided at the main entrance. The roof is covered with heavy, antique finish tile-slate in red with a light-green tinge resembling tile aged by years of wear. Gutters and downspouts are of lead-clad copper.

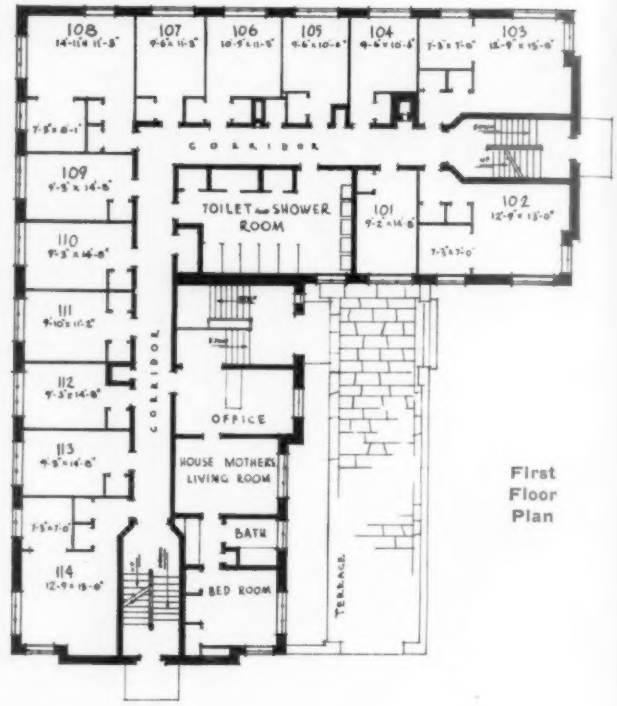
Interior Features

Other dormitories on the campus provided ample double-room facilities for medium-cost living standards; however, there was a definite demand for single rooms and suites, to satisfy a requirement for little better than medium-cost housing. Therefore the new building was planned to provide 29 single rooms, 8 double rooms and 9 suites, making a total designed capacity of 63 men, with the possibility of increasing the number by using some of the larger single rooms as doubles.

Each suite consists of a study for two men and a sleeping alcove furnished with a double-deck bed. The sleeping alcoves in these suites are separated from the studies with heavy curtains operating on metal tracks. The double-deck beds are demountable



Basement Floor Plan

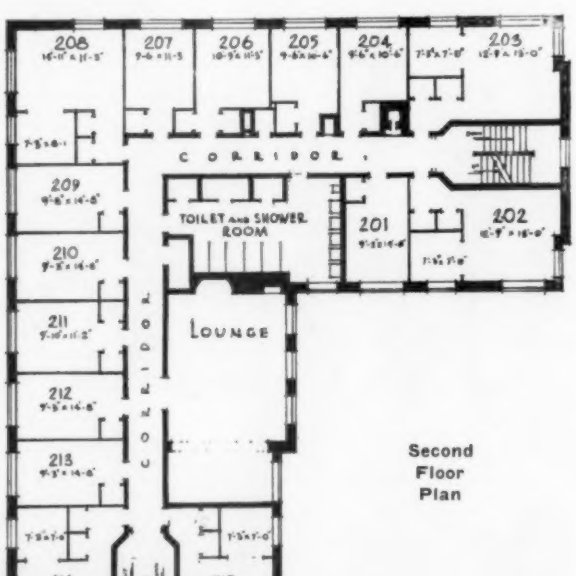


First Floor Plan

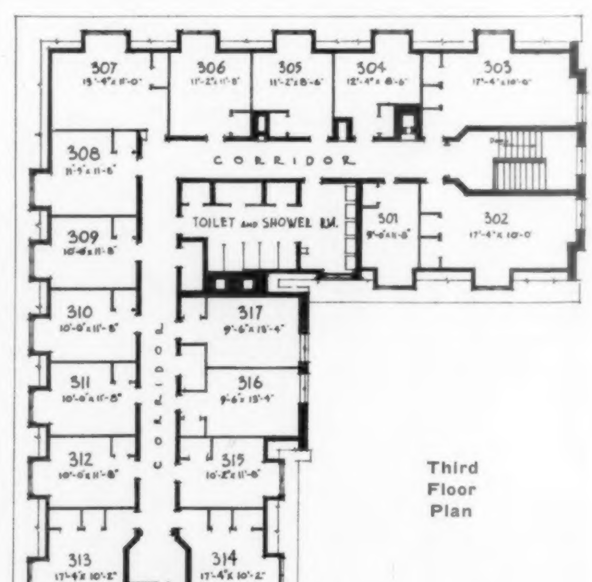
and may be converted into two single beds. Some of the men prefer to set up two single beds in the larger room, using it as a living room and bedroom, leaving the sleeping alcove to be used as a study. This arrangement of space and design of furniture make accommodations very flexible. An individual locked closet is provided for each occupant. Ventilation for closets is obtained by under-cutting the bottom of the door one inch and drilling a row of six one-inch holes across the top of the door.

Since plenty of natural light and fresh air are highly desirable in dormitory rooms, windows were designed to give an abundance of both. Each room has at least one window with a minimum of 20 square feet of glass area. Metal casement sash were used, equipped with hold-open arms and tapped for the installation of a binding post so that the sash may be used as a radio aerial. All room doors are fitted with adjustable metal louvers for through ventilation.

The house director's suite is on the first floor adja-



Second Floor Plan



Third Floor Plan

cent to the dormitory office. This suite consists of living room, bath, bedroom, and three large closets. A space in the corridor from the bedroom to the living room is provided for the future installation of a small unit kitchenette.

The basement contains a game room with double doors opening into the main dining room. This room may be opened to form a part of the main dining room when space is needed to feed large numbers at banquets and special dinners. The private dining room at the other end of the main dining room will accommodate 30 people and may be opened to form a part of the main dining room.

A lounge is located on the second floor.

A toilet and shower room is centrally located on each floor. Urinals are not included.

Although the kitchen may appear small on the plans, its compact arrangement has made it highly efficient and has proved satisfactory in use.

Steam is supplied from a central heating plant to a two-pipe overhead steam heating system. Cabinet type convectors are individually thermostatically controlled.

Specifying to Minimize Maintenance Problems

Roof is framed with 4 x 14-inch fir rafters and covered with 2-inch dressed and matched fir plank.

Ceiling and walls of third story are insulated with 4 inches of rock wool.

Foundation walls below first floor are reinforced concrete. Exterior walls above first floor are faced with brick and backed up with load-bearing haydite concrete block.

All exterior walls are furred.

Interior framing is steel encased in concrete fireproofing. Floor beams bear on exterior walls and on one line of columns placed along one side of the center corridor.

Floors are constructed of concrete over lath and steel joists. Main entrance landings and stairs and toilet and shower room floors are solid concrete slabs. Stairs at ends of corridor are steel.

Stair-well walls are constructed of structural wall tile finished with two coats of bakelite floor seal to facilitate cleaning.

Corridor partitions are 4-inch tile. Partitions between rooms and closets are 2-inch solid plaster on metal lath and ¾-inch steel channels.

All walls and ceilings except those in the main entrance, kitchen, dishwashing room and toilets are finished in rough sanded plaster. Shower and toilet rooms and kitchen walls are finished in ceramic tile. Our past experience with maintenance in dormitories has shown that smooth plaster walls finished with a flat or semi-luster paint are easily marred. Wall spaces above beds in men's rooms usually show rubber heel marks, and soil marks from contact of the hands upon the walls. Scratches upon the walls usually come from roommates using the beds as wrestling mats. We have found that in dormitories finished with rough plaster such soil is very seldom found above the beds. Rough plaster walls, of course, are harder to wash than smooth walls, but we believe that the year-round appearance and the better wearing quality more than compensate for the extra cost of wall washing.

In order to add to the comfort of the occupants of the building, acoustical tile is used on all corridor ceilings and on the ceilings of the dining rooms. Rubber silencers are fitted on all metal door bucks throughout the building, to reduce the noise of slamming doors.

Floors in all corridors, living rooms and dining rooms are covered with asphalt tile; shower and toilet room floors are of terrazzo; and the kitchen floor is of floor brick. Asphalt mastic tile floors, of course, are much easier to maintain than oak or maple flooring, and if proper care is exercised in selecting designs and color, it is possible to obtain a floor without the usual institutional appearance.

Window-sills are of marble. Anyone who has had to deal with the maintenance of wood window-sills will appreciate how much time can be saved in the maintenance of marble window-sills.

Trim other than the window-sills is of natural, dull varnished oak, except in the entrance and second-floor lounge, where walls and trim are of wormy chestnut. All doors to living rooms are flush type oak of the best quality available. Room and dining-room furniture is made to design in oak, finished to match room trim. Each room is fitted with concealed metal picture mold.

All the water bibbs throughout the building are of standard design with interchangeable parts, so that the maintenance department must carry in stock only one type of washer in order to be able to make repairs upon any bibb in the building.

The specification and selection of the best doors and hardware available, together with the use of metal door frames, has eliminated repairs to damaged woodwork about door frames, a thing which occurs quite generally in dormitories with wood door frames and cheap doors and hardware. All outside doors were given special attention. All joints with protruding members that might catch water and cause rot were protected by the insertion of copper strips. The tops and bottoms of all outside doors were covered with copper to prevent moisture from entering. It is hoped that this will at least double the life of the outside doors.

Two years of use have proved the wisdom of the building plan and the selection of materials.

SINGER SEWING MACHINE COMPANY

149 Broadway, New York, N. Y.

Why sewing teachers say:

LOOK AT THE POPULAR "66"—Singer's de luxe electric at small cost. It's the new version of a classroom favorite, made with these modern features:

- **Larger bobbin capacity**
- **Numbered tension dial**
- **Improved back-tacking device**
- **Hinged presser foot**
- **Fingertip stitch regulator**

See it at your Singer Shop. If you wish, an expert will work out for you a "Replacement Program," based on successful replacement schedules used by other schools.

"We Prefer Singer Machines!"

1. "Stand up under hard wear." Singer machines have a 90-year reputation for "taking it"—even the hard abuse of sewing-class pupils!

2. "Most homes have Singers." Pupils learn on the same kind of machine found in the majority of homes.

3. "Free educational service." Singer offers valuable courses, text books, wall charts, and aids—free to pupils and teachers on request.

4. "Free check-ups and adjustments." Teachers can take advantage of this free Singer Service at any time, by phoning the Singer Shop.

5. "Easy to get repairs." Prompt repair service is obtained from the local Singer Shop—entirely free except for needed parts.

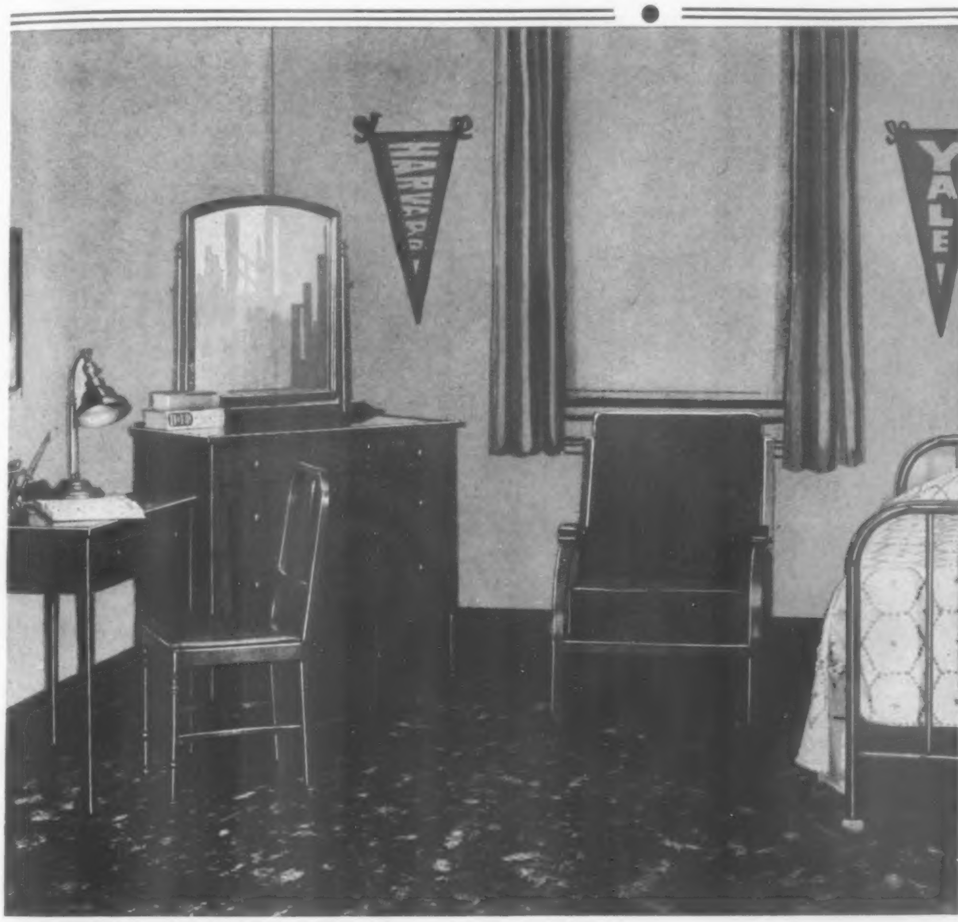
6. "Special discounts." Singer offers special school discounts on all machines, parts, and supplies.

WRITE FOR: Free help in planning classroom requirements. Address: Singer Sewing Machine Co., Dept. 735, 149 Broadway, New York, N. Y.

DOEHLER METAL FURNITURE CO., INC.

For Dormitory—Cafeteria—Reception Room—Infirmary

Executive and Sales Offices: 192 Lexington Avenue, New York



METAL FURNITURE

For Dormitories, Bedrooms and Infirmaries

CHROMIUM FURNITURE

For Auditoriums, Cafeterias and Offices

DOEHLER dormitory furniture and equipment is now being widely used throughout the country in many of the outstanding schools and universities. Our many years of experience in meeting the exacting demands for attractive, durable metal furniture is responsible for our enviable reputation in the dormitory equipment field.

The interior pictured above, illustrates only a small portion of our very extensive line of stock items particularly adaptable to school and dormitory use. Our line covers a complete range of varied designs in suites and separate pieces of both the traditional period design and the currently popular contemporary styles.

Doehler furniture is truly comfortable. All metallic sounds have been eliminated, drawers always slide easily, it never loosens, cracks or chips. All products are available in both natural wood grain reproductions and in pleasing, cheerful colors of Dohlite which is resistant to cigarette burns, hard knocks, steam heat, climatic conditions, and which always retains its original attractiveness.

WRITE FOR ILLUSTRATED CATALOGS AND COMPLETE DETAILS

FOR BEAUTY *PLUS* DURABILITY—

No. 421-1 Dresser

We illustrate one of our most popular Dormitory Suites, "THE PRESIDENT."

A number of other Suites, in modern and period designs, are available in groupings, or in individual pieces.

All items are available in both natural wood grain reproductions and in cheerful solid or duo-tone colors, finished to resist heat, acids and adverse climatic conditions, thus assuring a permanent attractive appearance.

No. 421-8 Night Table

No. 421-7 Desk

No. 421-2 Chiffonier

WITHOUT OBLIGATION WE WILL PREPARE BUDGETARY ESTIMATES FROM YOUR FLOOR PLANS

SELECT DOEHLER METAL FURNITURE

No. 505 Student's Library Desk

No. 292 Chair

Doehler Furniture is "BUILT LIKE A BATTLESHIP" to withstand endless years of hard usage. Its popularity is due to durable construction, distinctive designing and remarkably low pricing suitable to all budgets.

No. 277 Arm Chair

No. L.V.G. 171 Double Deck Bed

INQUIRE ABOUT OUR COMPLETE LINE OF SPRINGS, STUDIO COUCHES, COTS AND MATTRESSES

CREATING the RIGHT IMPRESSION with DOEHLER CHROME and STAINLESS STEEL

Doehler Tubular Furniture is now available in sparkling Chromium or Stainless Steel—Distinctive and rich in appearance, yet remarkably modest in cost. The colorful, cheerful upholstery materials are durable and easy to clean — the table tops, built of formica, will withstand heat and acid.

We particularly recommend the installation of this equipment in Cafeterias, Reception Rooms, Offices, Lobbies and wherever Furniture is required to withstand many years of hard usage.

Illustrating the suitability of Doehler Hospital Furniture to the modern college infirmary of today. The simple but smart styling lends an air of cheerfulness and friendliness which is ever desirable.

WITHOUT OBLIGATION
WE WILL PREPARE BUDGETARY ESTIMATES
FROM YOUR FLOOR PLANS

DOEHLER SYMBOLIZES QUALITY

WRITE FOR COMPLETE DETAILS AND ILLUSTRATED LITERATURE

MITCHELL MANUFACTURING CO.

Milwaukee, Wisconsin

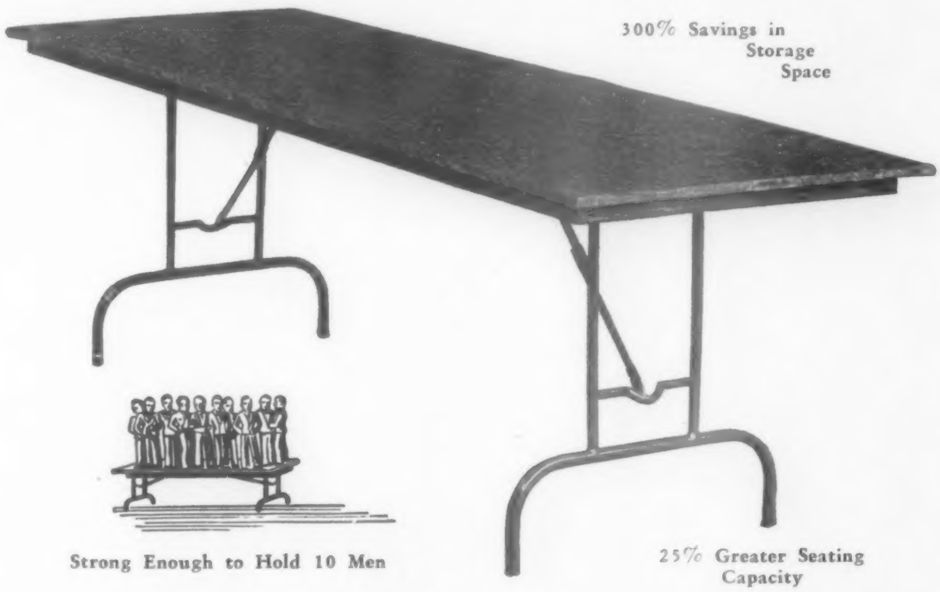
Playground Apparatus
Beach and Pool Equipment
Fold-O-Leg Tables and Benches

"Betterbilt"

Folding Choral Elevations
Folding Band Elevations
Sanitary Barn Equipment

FOLD-O-LEG TABLES

For cafeterias, sewing rooms, study tables, kindergartens, commercial departments, social rooms, recreation centers, table tennis, etc., Mitchell Fold-O-Leg Tables will satisfactorily replace the most expensive type. They are perfectly rigid because of their unique design and construction—yet each table requires only 2½ inches space when folded. Made in convenient sizes. Tops of Fir Veneer, Tempered Masonite Presdwood or Linoleum. Thousands have been re-ordered by old customers who originally tried just one table. Write today for Booklet No. 3.



300% Savings in Storage Space

Strong Enough to Hold 10 Men

25% Greater Seating Capacity

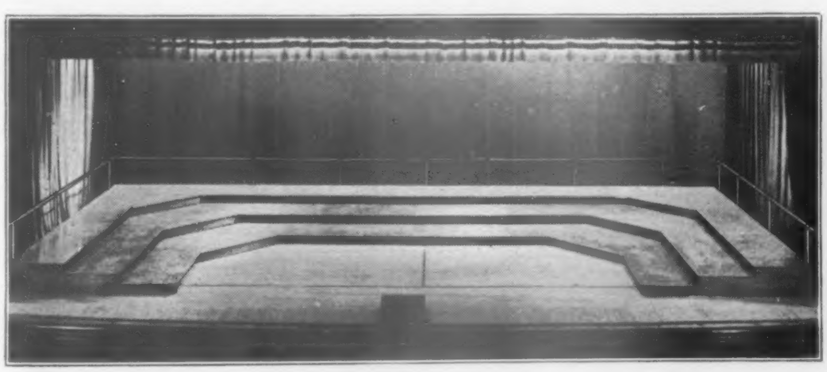
BOOKLETS (Illustrated)

1. "BETTERBILT" PLAYGROUND APPARATUS
2. "BETTERBILT" POOL EQUIPMENT
3. FOLD-O-LEG TABLES AND BENCHES
4. FOLDING CHORAL ELEVATIONS
5. FOLDING BAND ELEVATIONS
6. SANITARY BARN EQUIPMENT

STEEL-LEG PORTABLE FOLDING STANDS

FOR BAND, ORCHESTRA AND CHORAL GROUP ELEVATION, ALSO PLATFORMS FOR PLAYS, ETC.

Mitchell Portable Stands can be adapted to any need. Constructed in rigid units easy to handle. Rapidly moved from music room to auditorium stage or even to other places for concert work. Minimum storage space required for folded units and demountable safety steel rail. Available in any size. Thoroughly tested by many outstanding educational institutions. Write today for Booklets No. 4 and No. 5.



PARTIAL LIST OF SCHOOLS NOW USING MITCHELL PORTABLE FOLDING STANDS

Upland Schools, Upland, California
Colorado State College, Greeley, Colorado
Yale University, New Haven, Connecticut
Sterling Morton High School, Cicero, Illinois
Michigan State College, East Lansing, Michigan
Board of Education, Ferndale, Michigan
Sarah Lawrence College, Bronxville, New York
St. Joseph's Academy, Mc Sherrystown, Penna.
Orange High School, Orange, Texas
Washington High School, Milwaukee, Wisconsin
Watsonville Union High School, Watsonville, California
Morgan Township School, Valparaiso, Indiana
Board of Education, Robbinsdale, Minnesota
Villanova College, Villanova, Pennsylvania
Bratenahl School, Brighton, Ohio
North Division High School, Milwaukee, Wisconsin

SIMMONS COMPANY

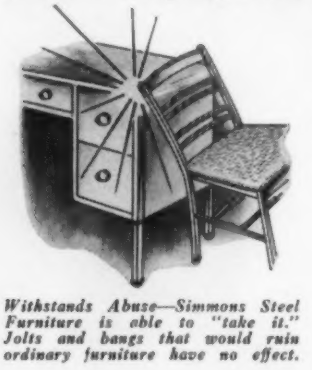
DORMITORY DIVISION

Merchandise Mart Chicago, Illinois

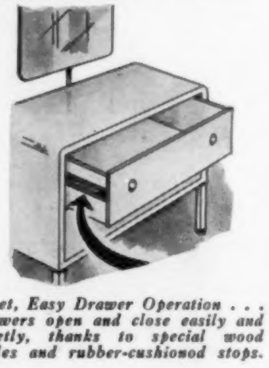
SIMMONS STEEL FURNITURE is "made to order" for dormitory use—combines the strength and durability of everlasting steel with the beauty of line and color that young people like. You may choose any of 20 attractive color schemes or 15 wood grain finishes. All are extremely resistant to stains, burns, and impact damage. Fire hazards are eliminated, as far as furniture is concerned.

Back of these advantages stand the facilities of the Simmons Company, world's largest manufacturer of Steel Furniture and Sleep Equipment. Quality is controlled from raw materials to finished product. Skill in design, craftsmanship in production, enterprise in product improvement . . . these are your assurance of value in every item of the complete Simmons Steel Furniture line.

A Simmons Salesman—familiar with dormitory furnishing problems—will be glad to help you select the Simmons equipment that meets your decorative and budget requirements. There is no obligation.

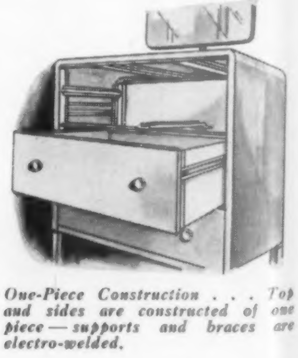


Withstands Abuse—Simmons Steel Furniture is able to "take it." Jolts and bangs that would ruin ordinary furniture have no effect.



Quiet, Easy Drawer Operation . . . Drawers open and close easily and quietly, thanks to special wood guides and rubber-cushionod stops.

Finish Durability . . . Weather has no detrimental effects on Simmons Steel Furniture. The "Simfast" finish is unaffected by heat or cold.



One-Piece Construction . . . Top and sides are constructed of one piece — supports and braces are electro-welded.

SIMMONS DORMITORY FURNITURE AND SLEEP EQUIPMENT

Modern Simmons room arrangements for dormitories are cheerful and practical in appearance. The rooms below are typical of the pleasant and comfortable living conditions assured by Simmons Steel Furniture.

In the rooms of the new girls' dormitory at the University of Wisconsin, 500 Simmons beds, springs, mattresses and chests are being used. The modern lines of Simmons Steel Furniture appeal to both men and women students of all ages.

SIMMONS ROOM 206-R is a room any young man would like. There's a feeling of solid comfort about it. The warm tones of the Modern American Maple finish are an outstanding feature of this colonial suite. The double desk has convenience features that make it a logical choice.

SIMMONS ROOM 605. The same features of convenience and long lasting attractiveness that have made this room so popular in nurses' and internes' quarters make it an excellent choice for dormitories everywhere. It is practical from the administrator's point of view and pleasant . . . cheerful . . . livable from the occupant's point of view.

SIMMONS ROOM NO. 9. An excellent choice for the school infirmary. The simple, graceful lines of the furniture are pleasing, making this room an exceptionally effective solution where budgets are limited. Maple finish is shown—colors or other wood grains may be selected.

B-950 DOUBLE DECK BUNK. The attractive appearance and great utility of this Simmons item make it a favorite for dormitory rooms. Colonial in design, it has the strength to stand abuse. It is equipped with Slumber King springs, has long bearing corner lock, and may be taken apart and used as twin beds.

SEND FOR THIS CATALOG TODAY!

This new 42-page catalog is arranged for ready reference, contains hundreds of illustrations, many of them in color, and gives detailed information about Simmons Steel Furniture and Sleep Equipment. It will be mailed to any school official without cost. Send for your free copy today!

SUPERIOR SLEEPRITE CORPORATION

General Offices and Factory: 2219 S. Halsted Street, Chicago

Manufacturers of METAL FURNITURE, BEDS, COTS, BED SPRINGS, and MATTRESSES for School Dormitories, Libraries, Infirmaries and Cafeterias.

Complete facilities for quantity manufacture to individual specifications. Your inquiry is invited.

Superior Sleeprite Metal Beds are manufactured in a wide diversity of types and designs to meet every dormitory and sleeping room requirement. Extra ruggedness is provided by all-welded construction. Coil, band or link-fabric springs, with single or double corner locks, are optional. Illustrated are (left, top to bottom) Nos. CT 660-CB; CT 659-CC and CT 691-LA. On the following page, Double Deck Bunk Bed No. CT 685-BF. For other beds, cots and concealed sleeping equipment see our Catalog No. CT 41.

For libraries, study rooms and cafeterias, Superior Sleeprite manufactures an extensive line of steel tables and desks, each designed and top-surfaced to meet specific requirements. Our numerous standard production patterns of steel and chrome chairs permit economical solution of seating problems.

* * *

Meeting the demands of the Nation's Armed Forces is an obligation we are proud to fulfill. We suggest that you anticipate your requirements and make inquiry as far ahead of actual need as is possible. In 1942, things will be done in the order of their importance to the achievement of the goal we unitedly seek. This is as you would have it—in our Factory and in every other factory.

* *

Illustrated: Double Study Desk CT 727. Center drawer on each side. Chair CT 303; seat upholstered in simulated leather

8 REASONS WHY

SUPERIOR All-Metal Furniture serves you most economically

1. Low initial cost.
2. Finest quality, long-life material.
3. Rugged welded assembly.
4. Sound-deadened construction.
5. Resistant to fire and water.
6. Unaffected by humidity or climate.
7. Modern styling—maximum space utility.
8. Beautiful baked-on finish that provides the utmost protection obtainable against wear, stains and burns.

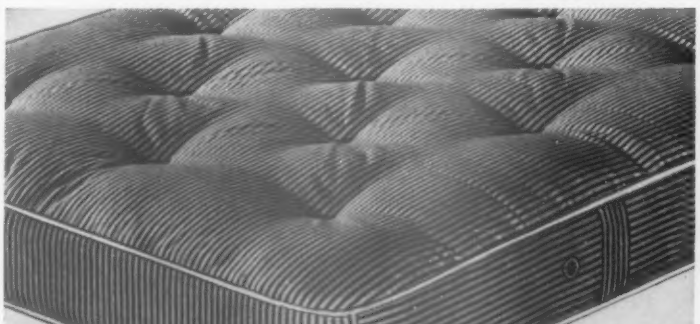
DRESSER
CT 414-10
Standard line includes Chiffonier, Bed, Desk, Table, Chairs and other pieces to match

THE FINISH LASTS WITH THE STEEL IT COVERS

The deep, lustrous baked-on finish of Superior Sleeprite Products faithfully reproduces beautiful, costly wood grains, or may be had in 16 specially selected color tones. It is impervious to water, most drugs and medicines; resists cigarette burns and other ordinary defacements; it is easily cleaned and maintained in "like-new" appearance.

NEW 44-PAGE CATALOG—Write for new 44-page Catalog CT 41 replete with illustrations and specifications of Superior Sleeprite Products and full color reproductions of Superior Sleeprite's handsome Wood Grain, Combination and Solid Color Finishes. Address CONTRACT DEPARTMENT, Superior Sleeprite Corporation, 2219 S. Halsted Street, Chicago.

Virtually every type of Institutional mattress is made in our great, modern mattress factory. Our products range from the finest inner-spring mattresses to simple cotton-felt pads for cots, and our facilities enable us to manufacture to your individual specifications at low, mass-production costs.



S. BLICKMAN, INC.

Manufacturers of Food Service Equipment for Schools and Institutions EST. 1889 **WEEHAWKEN, N. J.**

COMPLETE INSTALLATIONS FOR KITCHENS, CAFETERIAS, RESTAURANTS AND LUNCHROOMS

Specialists for over fifty years in the planning, manufacture and installation of complete units. Pioneers in the development of Stainless Steel Food Service Equipment. Modern, fully-equipped plant employs A.S.M.E. code welders and other skilled craftsmen. Careful control of fabrication at every stage of manufacture assures a perfect job and full retention of valuable physical properties of alloys used. Important advantages of Blickman equipment include: all-welded heavy-duty construction—fully-rounded corners and coves—integral rolled edges—seamless, crevice-free, sanitary surfaces—strength—ease of cleaning—attractive appearance.

Planning and Engineering Service—An engineering department, trained to complete a project from plan to installation, is ready to serve you. Complete specifications, floor plans, detailed drawings, plumbing plans and the necessary co-ordination with any other trades which may be involved, are available to those who engage our services.

Cafeteria counter, Syracuse University—Plate No. 1582

INDIVIDUAL ITEMS OF FOOD PREPARATION AND FOOD SERVICE UNITS Include:

Automatic Electric Hot Food Storage Tables
Bain Maries
Cabinets
Cafeteria Counters
Cereal Cookers
Coffee Urns
Cooks Tables
Dish Heaters
Dish Tables
Dish Trucks
Food Conveyors
Food Trucks
Kitchen Cabinets
Pan and Pot Racks
Pantry Cabinets and Cupboards
Plate Warmers
Preparation Tables
Range Hoods
Service Units
Sinks
Steam Tables
Storage Bins and Closets
Tray Trucks
Utility Trucks
Urn Stands
Warmers
Water Coolers
Work Tables

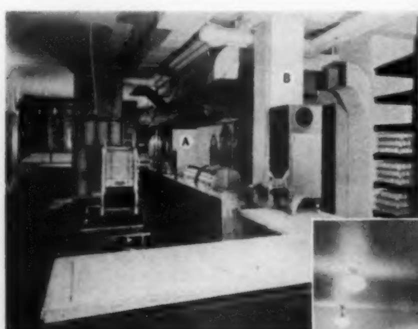
Special equipment built to specifications

TYPICAL BLICKMAN INSTALLATIONS

Cornell University, Ithaca, N. Y., College of Home Economics
Columbia University, New York, N. Y.
Syracuse University, Syracuse, N. Y.
University of North Carolina, Chapel Hill, N. C.
Vassar College, Poughkeepsie, N. Y.
Virginia Polytechnic Institute, Blacksburg, Va.
Hershey Industrial High School, Hershey, Pa.
Bayonne Senior High School, Bayonne, N. J.
High School for Needle Trades, New York City
Suffern Grade School, Suffern, N. Y.
City of Washington, D. C.—15 schools
City of Philadelphia, Pa.—5 schools

A modern kitchen installation by S. Blickman, Inc. The Stainless Steel equipment assures permanence, sanitation and ease of cleaning. Note the rolled edges, fully-rounded corners and smooth, permanently bright surfaces—Plate No. 1506

MODERNIZING INADEQUATE FACILITIES FOR MORE EFFICIENT SERVICE



BEFORE: Cafeteria at Johnson Hall, Columbia University, before re-design. Note U-shaped counter and the two building columns "A" and "B" protruding in front of it, obstructing traffic.

AFTER: View of same room after re-planning by Blickman engineers. Note the clean design and orderly arrangement and how building columns "A" and "B" have been relegated to a position in work space behind counter. Blickman Stainless Steel equipment was used throughout.

● We help school administrators and dietitians modernize cafeteries, etc., to meet the demands of expanded patronage. This example, illustrates how one of America's leading universities **streamlined** for serving 2000 meals a day.

The Problem: In the cafeteria at Johnson Hall, Columbia University, traffic was slow around a U-shaped counter. Aisles were congested and building columns protruding in front of counter further obstructed traffic. How was service to be speeded up without using additional floor space? How was provision to be made for combining self-service during breakfast and luncheon, and table service for dinner?

The Solution: Blickman Engineers found that by reversing the entire floor plan and establishing the traffic aisle in the work space behind the original counter, they could make these improvements: (1) Design a straight counter, eliminating bends and speeding up flow of traffic. (2) Increase effective counter length and capacity. (3) Relegate the building columns to the work space behind the counter, entirely out of the way of traffic.

THE CLEVELAND RANGE CO.

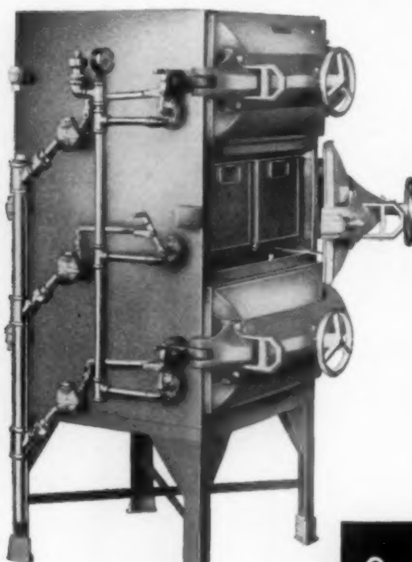
Cleveland, Ohio

STEAM-CHEF STEAM COOKERS

for all School, College and Institution Kitchens. Direct Steam—Gas—Electric Operation

BUILT by specialists on steam cookers, STEAM-CHEF Steamers are the result of many years' experience with school and college requirements. They are today successfully serving hundreds of leading educational institutions the country over. A STEAM-CHEF Cooker embodies ALL approved modern features of construction. It is an effective saver of time, space, work and fuel. Always ready for action, it frees your range top for other purposes, and can be used for many foods now prepared in other ways. The STEAM-CHEF is designed for convenience and ease of operation. The average person can quickly get maximum results. There is a proper STEAM-CHEF model, operated by direct steam, gas, or electricity, to fit your individual requirements, whatever they are. To retain flavor, natural food elements, and nutritive values, steaming is a method of cooking accepted by the highest authorities. To obtain steaming at its best, be sure your equipment is the most efficient and up-to-date—that means STEAM-CHEF.

Send for interesting booklet "Getting the Most from Steam Cooking"



MODEL 101-3B
Cleveland "Steam-Chef"
Direct Connected Unit

Body Construction — One-piece welded bodies of heavy plate steel, rust-proofed or stainless, easy to keep clean and sanitary, insuring low maintenance cost and extra durability.

"Full Floating" Doors—An exclusive Steam-Chef feature, always seat perfectly, never require adjustments, prolong gasket life.

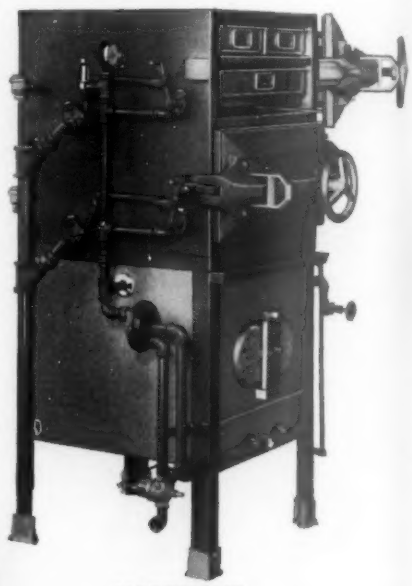
Safe Operation — Maximum safety results from doors which cannot be opened while steam is being admitted to compartment.

Synchronized Thermostatic Control—Achieves new economy and convenience. Eliminates necessity for steam vent line and cuts steam consumption 50% to 80%.

Automatic Control—of both fuel and boiler water level is provided on gas and electric units—an exclusive feature, effecting fuel saving of 33⅓%.

Sizes and Types—Over 50 models, sizes and types—capacities 2 to 7½ bushels per charge—standard units to fit practically any requirement.

Cleveland STEAM-CHEF
for better cooking—STEAM



MODEL 2-SB
Full automatic gas operated "Steam-Chef." Gas and water automatically controlled

PROMINENT SCHOOL INSTALLATIONS

Dartmouth College, Hanover, New Hampshire
Cornell University, Ithaca, New York
Syracuse University, Syracuse, New York
University of Texas, Austin, Texas
Purdue University, Lafayette, Indiana
Vassar College, Poughkeepsie, New York
Ohio State University, Columbus, Ohio
Northwestern University, Chicago, Illinois
University of Wisconsin, Madison, Wis.
University Dining Halls, Princeton, New Jersey
University of Michigan, Ann Arbor, Michigan
A. & M. College of Texas, College Station, Texas
University of New Mexico, Albuquerque, New Mexico
Hunter College, New York, N. Y.
Duke University, Durham, North Carolina
University of Indiana, Bloomington, Indiana
University of Minnesota, Minneapolis, Minnesota
Michigan State College, East Lansing, Mich.
Mellon Jr. High School, Mt. Lebanon, Pennsylvania
Preston School of Industry, Ione, California
Cranwell Preparatory School, Lenox, Massachusetts
Madison College, Harrisonburg, Virginia
Kearney State Teachers College, Kearney, Nebraska
Louisiana Polytechnic Institute, Ruston, Louisiana
University of Akron, Akron, Ohio
Bellingham High School, Bellingham, Washington
Bryn Mawr College, Bryn Mawr, Pennsylvania
Mark Keppel High School, Alhambra, California
Everett High School, Everett, Washington
Brooklyn H. S. for Homemaking, Brooklyn, New York
Kalamazoo College, Kalamazoo, Michigan
Garfield High School, Los Angeles, California
Senior High School, Billings, Montana
Arthur Hill School, Saginaw, Michigan
Salem High School, Salem, Washington
Port Richmond High School, Richmond Borough, New York
University of Maine, Orono, Maine
Chicago Board of Education, various locations
Brooks School, North Andover, Massachusetts
Swarthmore College, Swarthmore, Pennsylvania

[Complete information and detailed specifications will be furnished on request. Sold through recognized kitchen equipment dealers everywhere.]

EDISON GENERAL ELECTRIC APPLIANCE COMPANY, INC.

5633 West Taylor Street, Chicago, Illinois

Hotpoint EDISON

Electric Cooking Equipment for Schools

New Low-Priced BRAWNY LAD Electric Range

A low-priced commercial range, the "Brawny Lad" is designed for school lunch rooms where food is prepared to serve from ten to fifty persons per meal.

The "Brawny Lad" has a large, fast, automatically controlled, All-Purpose oven. The custom-built cooking top may be equipped with four Hi-Speed Calrod surface units; or four circular cast-in-iron Calrod units; or combinations of both; or two round units with a 12" x 24" automatic griddle; or a 24" x 24" automatic griddle. The "Brawny Lad" is 30" wide, 30" deep, 36" high. Connected load: 12 KW.

HOTPOINT-EDISON Automatic Electric Fry Kettle

Easy to drain, easy to clean and keep clean. Three types are available: 1. Model illustrated, the K-31, with 25 lbs. fat capacity. 2. The same model with a floor stand. Automatic Heat Manager Temperature Control reduces fat absorption to a minimum. Operating cost is low because heat is generated directly in the fat by Hi-Speed Calrod Immersion Units. Preheats in 16 minutes. 15¾" from front to back. 17¾" wide. Uses only 667 watts to maintain 350° F. temperature. 3. The round, portable type fry kettle No. KA-19. 10 lbs. fat capacity.

New HOTPOINT-EDISON Automatic Electric Bake Oven

Each oven section is complete in itself. Dimensions of 2-deck bake oven: 54⅜" wide by 38³⁄₁₆" deep. Maximum two-deck height: 70". Baking compartment holds 2 roll-pans, or 20 one-pound loaves of bread, or 12 nine-inch pie tins. Roasting compartment 12" high, holds 125 pounds of meat.

"HEAT MANAGER" Automatic Electric Griddle

Provides the *right* temperature *where* you want it—*when* you need it. Grills every order appetizingly perfect in appearance, texture, and taste. The G-32, illustrated, is 12" deep by 24" long by 9⅞" high. Also available in G-28—18" deep.

ALSO A COMPLETE LINE OF ELECTRIC COMMERCIAL RANGES, BROILERS, SALAMANDERS, BAKING AND ROASTING OVENS, FOOD AND PLATE WARMERS, EGG BOILERS, STOCK KETTLES, FRY KETTLES, GRILLS, GRIDDLES, WAFFLE BAKERS, HOT FOOD STORAGE UNITS.

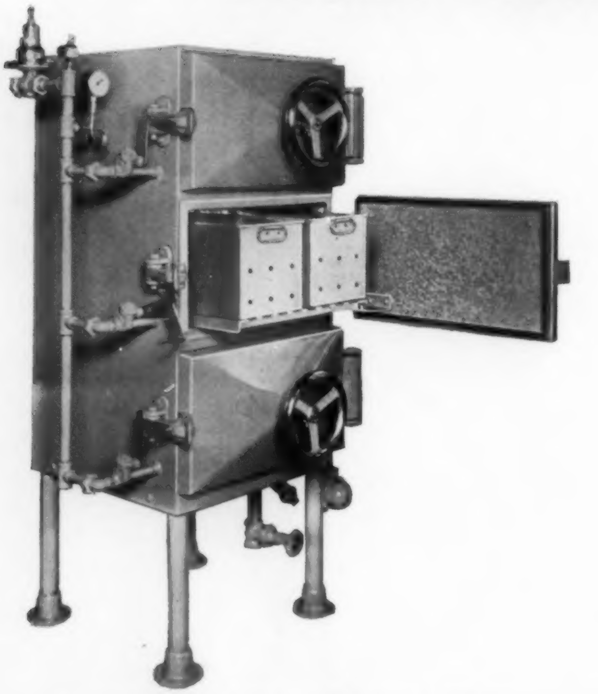
FOR SALE THROUGH LEADING KITCHEN EQUIPMENT HOUSES

Boston • New York City • Atlanta • Cleveland • Chicago • Kansas City • Dallas • Los Angeles • Seattle • Salt Lake City • Canada—*Canadian General Electric Co., Ltd., Toronto*

MARKET FORGE COMPANY

Everett Station
Boston, Massachusetts

Complete Control of Food Preparation with "MAFORCO" COMPARTMENT STEAMERS



Proved Advantages of Steam Cooking

Although proper preparation of food has taken tremendous strides during the last few years, the great majority of people do not yet realize the importance of **steam cooking** in **preserving vital food values.** Calcium, magnesium, phosphorus and iron, Vitamins B and C—all are soluble in water and are therefore readily lost by boiling. Live steam keeps the natural juices sealed within the food. Accepted research has shown that losses through steaming are only one-third of those incurred by boiling.

Flavor also is lost when soluble materials have been **cooked** or **boiled** out of foods. **Steam cooking** retains the natural, characteristic flavors of foods, as well as their proper **texture** and **color.**

Economy: Steam cooking is **less expensive** than previously used methods:—Less fuel is used. Food shrinkage is almost entirely eliminated. Kitchen space is conserved (one three-compartment steamer doing the work of a six-foot range in one-third the space); and, most important of all, there is a definite saving of operating labor. No attention is required during the steam cooking—no danger of boiling over, etc.—It is only necessary to time the brief cooking periods, and these cooking periods are almost unbelievably brief!

An interesting list of recent MAFORCO installations

Yale University, New Haven, Conn.
Navy Yard, Bldg. 18, Portsmouth, N. H.
Boston Navy Yard, Charlestown, Mass.
Naval Base, Coco Solo, Canal Zone
S. S. Queen Mary
Fort Shafter, Hawaii
Fort Warren, Wyoming
Northfield Seminary, E. Northfield, Mass.
Mystic Oral School, Mystic, Conn.
Classical High School, Springfield, Mass.
Edgewood Arsenal, Edgewood, Md.
Borinquen Field, Puerto Rico
Camp Locket, California

Proved Advantages of the MAFORCO Low-Pressure Steamer

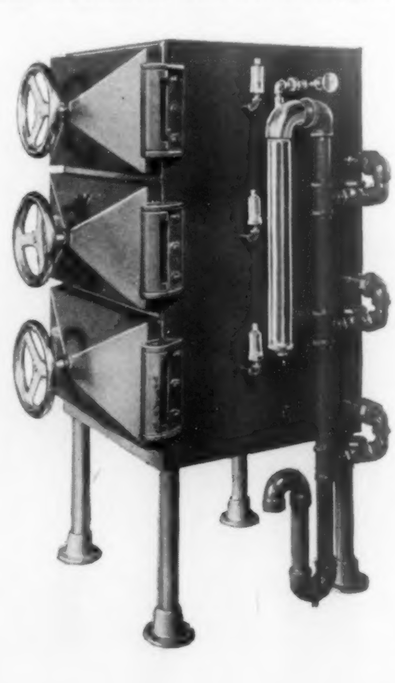
The MAFORCO modern line of Low-Pressure Steamers is now to be found in school and college buildings, hospitals and other institutions in all parts of the country because of its proved **efficiency, economy, speed, ease of handling, safety,** and the **first-rate, attractive, flavorful, nutritive food** which each steamer dependably turns out. Vegetables, meats, fowl, sea foods, fruits, puddings, all are quickly and appetizingly cooked in a MAFORCO compartment steamer. The use of separated compartments completely eliminates the intermingling of odors.

Operators find the MAFORCO compartment steam cooker also **easy to clean,** and **economical in both floor space and steam consumption.**

Only the **best of rust- and corrosion-resisting materials** are used in building the MAFORCO Steamer.

Special features are the ingeniously designed **full floating door** and the **automatic sliding shelves,** which pull out automatically when the doors are opened, making the hot steaming baskets conveniently accessible. **An important safety feature**—steam is automatically cut off before door can be opened.

Two major types of MAFORCO Steamers are built: the Standard Thermostatic Control model, which cooks at a steady, even temperature and saves more than half the steam used in the other model; and the Free Venting Steamer, with or without a Condenser to carry the steam away (at small extra cost). For complete details of both these types, see the booklet, "COMPARTMENT STEAMERS FOR MODERN STEAM COOKING," sent free on request.



THE HOBART MANUFACTURING CO.

Makers of Electric Food-preparing and Dishwashing Machines for Commercial and Institutional Kitchens and Bakeries

Troy, Ohio

ATLANTA, GA., 336 Marietta St., N. W.
CHICAGO, ILL., 61 Wacker Drive
DALLAS, TEXAS, 2034 Commercial St.

LOS ANGELES, CALIF., 412 S. Los Angeles St.
NEW YORK, N. Y., 71 Madison Ave.

SAN FRANCISCO, CALIF., 929 Mission St
ST. LOUIS, MO., 1935 Washington Ave.
SEATTLE, WASH., 2208 Second Ave.

CANADA: Head Office, 119 Church St., TORONTO

SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES (Consult Telephone Directory)

HOBART FOOD MACHINES ARE SOLD THROUGH LEADING KITCHEN OUTFITTERS

Illustrations show representative models only; each line of Hobart Machines comprises a range of sizes to fit any application, from the smallest to the largest school kitchen

Hobart Mixers

Built in 3, 5, 10, 12, 15, 20, 30, 40, 60, 80 and 110-quart bowl capacities. They mix, beat, whip, blend, mash. With attachments they chop, grind, slice, shred, grate, crumb, sieve, strain, etc.

Hobart Air Whip Attachment (for Hobart Mixers only) supplies advantages in regular mixing bowl operations, by better aeration; improves cake quality tremendously; reduces mixing time as much as 30% to 40%.

Hobart Glass and Dish Washers

Automatic and semi-automatic models. They wash all tableware **clean,** with a high degree of sanitization, in the shortest possible time. They carry such exclusive features as Revolving Wash Arms and the patented Dual-Drive Conveyor.

Hobart Slicing Machines

Hobart Slicing Machines are ideal for all boneless meats, hot or cold, cooked or uncooked, bread, cheese, vegetables, fruits, etc. Convenient to operate, speedy, quiet, and easy to clean. Maximum safety.

Hobart Air Whip Unit

Introduces a superior method of whipping cream. In a few seconds it produces 3 or more quarts of whipped cream from 1 quart of liquid cream. It whips by air, keeping all the freshness and sweetness of the cream. More and better whipped cream dishes can be made at less cost.

Hobart Potato Peelers

Bring new savings in time and food costs. There are four sizes, with capacities of from 8 to 45 lbs. Quiet, speedy and watertight, they peel potatoes and all root vegetables "in no time," with negligible peel loss.

Hobart Food Cutters

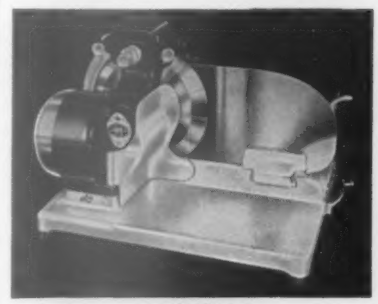
Embody distinct advances in speed, thoroughness, safety, ease of cleaning, and economy of space. They cut up meats, vegetables, firm fruits, cocoanuts, citron, nuts, boiled eggs, beets—practically anything in the food line, uniformly in a few seconds' time.

GUARANTEE AND SERVICE

All Hobart Machines are fully guaranteed and serviced by **one** nation-wide organization. This avoids uncertainty, confusion and money-losing delays.

Peelers

Air Whips



Food Slicers

Food Cutters

Dishwashers—*Left:* Compact, low-priced heavy-duty unit, "LM" *Center:* "AM-5" de luxe. *Right:* "XM-2," fully automatic

Mixers—*Left:* A-200, "two mixers in one" —20 and 12-qt. bowls. *Right:* M-80 Super Mixer

STANDARD GAS EQUIPMENT CORPORATION

18 East 41st Street, New York

BRANCH OFFICES

Boston | Philadelphia | Baltimore | Aurora, Ill. | Chicago | New Orleans | Los Angeles

VULCAN GAS COOKING EQUIPMENT

(A)

NEW EVEN-HEAT TOP RANGE

Reinforcing ribs and nibs on underside of heavy top unit plates absorb and diffuse heat evenly. Can be furnished with fry top

(B)

VULCAN SUPER RADIAL-FIN TOP

Radial-Fin Top with new ventilated ring and cover plate. Top heating is speeded up, heat distribution improved, larger cooking area provided. A new "concentrated flame" 4-ring burner improves combustion, gives greater over-all cooking heat and increased center heat. Cuts top cooking costs 20%

VULCAN PAYS ITS WAY IN SAVINGS!

Many school cafeterias have found that modern Vulcan equipment makes three substantial savings over old cooking equipment generally in use.

SAVES 20% or more on top cooking costs because new improved Radial-Fin Tops heat faster and better with less gas.

SAVES up to 50% in ovens because insulation and heat control reduce gas consumption while 2-compartment oven doubles capacity for many roasting jobs with same amount of gas.

SAVES up to 30% in meat shrinkage because automatic heat controls give accurate oven temperatures and so prevent over cooking. This saving alone has paid a large part of the cost of new equipment in many kitchens.

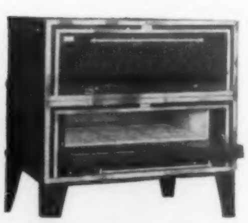
Vulcan Equipment is the result of 50 years of experience with School Cooking problems. With the Vulcan co-ordinated unit plan you can modernize ***your*** kitchen completely or in part and add additional equipment as demand increases or budgets permit.

Write for Catalog ASU-12 illustrating and describing the complete Vulcan line

(C)

NEW "EXPANDO" TOP UNIT

Provides additional top area at a fracton the cost of complete range. 15⅝ in. wide. Can be connected right or left



VULCAN MULTIPLE-HEAT-CONDUIT OVENS

Each deck has own burner and automatic heat control. Heavily insulated. Unusually even heat. Can be assembled like sectional bookcases. 10 sizes and styles

(F)

"LO GLO" CERAMIC BROILER

New center burners project flames to sides across ceramic radiants, giving superior, faster broiling qualities. Large upper oven heated by broiler burner

(E)

DEEP FAT FRYER

Heats faster—responds instantly when food is put in. Brings frying fats to proper heat faster. Cuts fat and fuel costs

(D)

NEW OPEN TOP RANGE

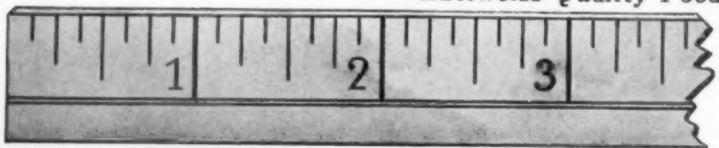
New economical circular non-clog burners. Smoother, heavier semi-solid top grates. Two - compartment, insulated oven. Oven heat control

JOHN SEXTON & COMPANY

Manufacturing Wholesale Grocers

Chicago — Importers — Coffee Roasters — Brooklyn

Edelweiss Quality Foods



The Standard of Comparison

CHICAGO

John Sexton & Co., welcomes comparison with any other food supply service for those who feed many people each day. Check the following facts about Sexton and Sexton service with the corresponding facts about any other similar service.

SEXTON SERVICE	ANY OTHER SERVICE
1. Established in 1883—continuously under Sexton management.	1.
2. Responsibility—the highest.	2.
3. Superb Service—Daily delivery New York and Chicago. All orders shipped within 24 hours of receipt.	3.
4. Coffee Merchants for over 50 years. Direct importations—daily roasting—a saving to you in every pound.	4.
5. All fruits and vegetables selected according to Sexton specifications. Uniform number of servings to the tin. All cans chock-full of fully ripened and delicious fruits or vegetables.	5.
6. A complete variety of high quality preserves and jellies, gelatine desserts, extracts, baking powder made in Sexton Sunshine Kitchens.	6.
7. Sexton pickles, rich in Oriental spices, pickled in pure vinegar and crystal cane sugar in Sexton Sunshine Kitchens.	7.
8. Pre-eminent importers of Spanish olives—save buyers one profit.	8.
9. Tender leaf teas imported from the Tea Gardens of Japan and India. Sexton teas retain the full volume of essential oils and theine found in the blossomed leaf.	9.
10. A large staff of thoroughly trained salesmen, experienced with the needs of those who feed many people each day. A Sexton representative in every state in the Union.	10.
11. Endorsed by the National Associations of the various enterprises feeding many people each day.	11.
12. The Sexton guarantee of complete satisfaction or money cheerfully refunded accompanies every sale.	12.

BROOKLYN

If you are among the vast number of Sexton patrons, you have proved already the convenience and economy of these and other features of Sexton service. From all others we invite a trial order, the severest test you can make

SERVICING A MODERN LABORATORY—IV

Perpetual Inventories and Accounting Methods

By W. B. FOULK

Curator, Frick Chemical Laboratory, Princeton University

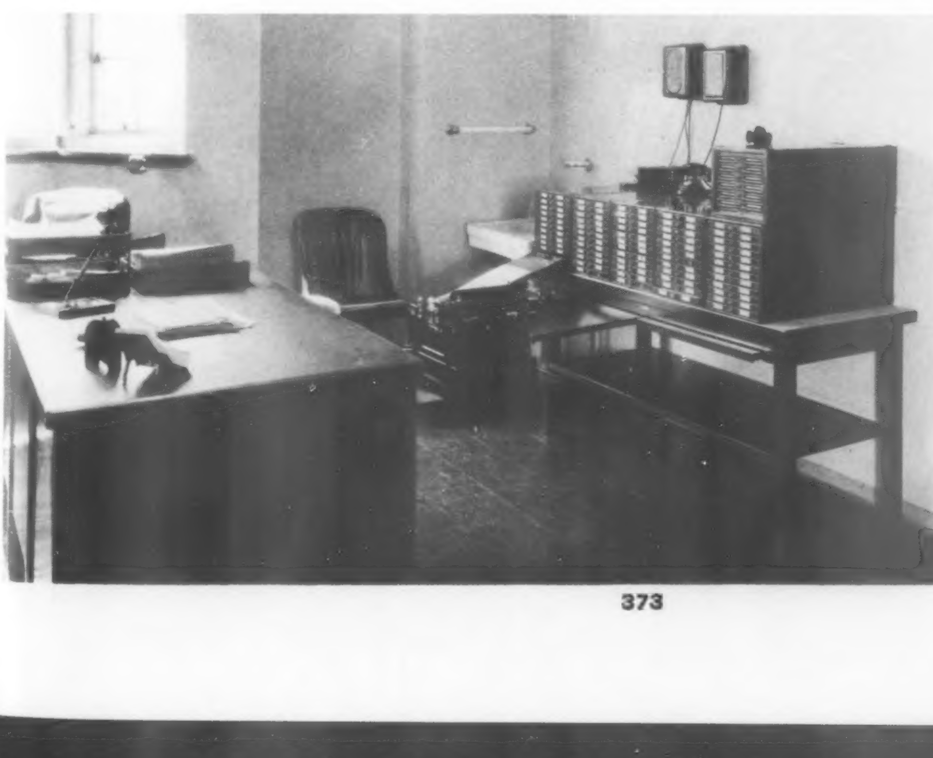
In earlier articles in this series, acquisition of apparatus and supplies, their storage and distribution, besides numerous auxiliary services associated with the ultimate objective of placing such working tools in the hands of the students and research personnel as expeditiously and economically as possible, were considered. It is the purpose of this article to discuss the methods of checks and controls that make the services previously discussed effective. Of primary importance in any supply system is an adequate perpetual inventory. An accurate perpetual inventory is as useful a tool in efficient and intelligent purchasing as it is in respect to accounting for supplies and preventing waste. Such a record should make it possible to ascertain quickly the amount of any article on hand at any time, the quantity received in stock during any given period, and its location.

In the Frick Chemical Laboratory storerooms, some 2,000 items of apparatus and a like number of chemicals are regularly carried in stock; these are in addition to instruments and other articles we designate as special apparatus, which are also listed on cards and will be described later in this article.

Perpetual Inventory and Purchase Records

The perpetual inventories are located in the administrative office, where they can be readily referred to, and are housed in "visible" record files. The files are composed of trays containing pockets in which the cards are inserted. The index line at the bottom of the card is visible through a celluloid strip at the bottom of the pocket as they lie flat in the tray. This enables the individual cards to be quickly found and, as the pockets are hinged, they readily fold back, exposing the whole card, so that records may be made or referred to without removing the card from file.

Large cards, 8 x 9 inches, specially ruled as illustrated, are used. When folded, these correspond to



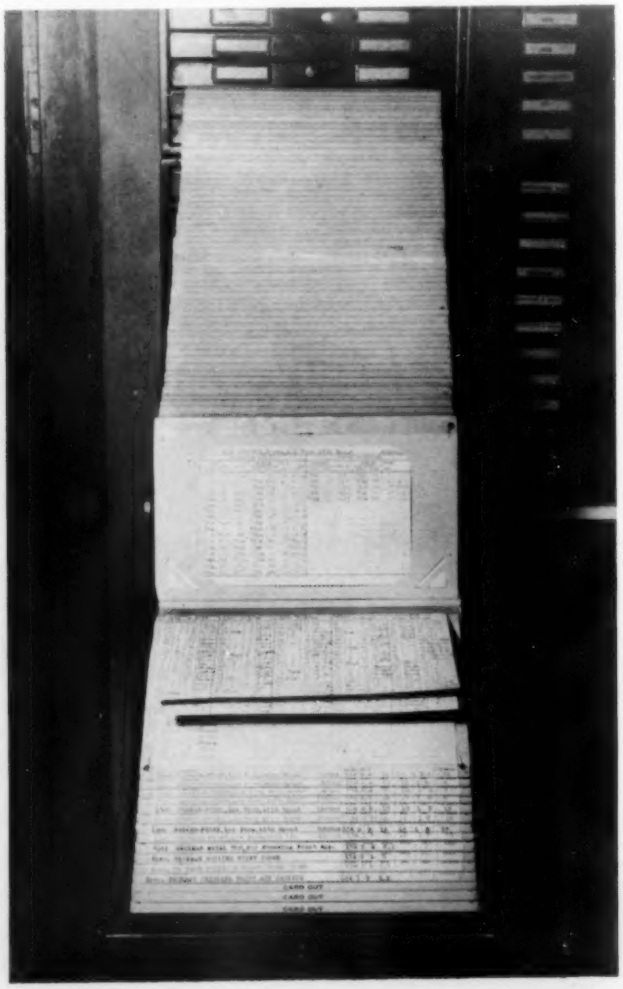
Visible record files in the administrative office

an 8 x 5-inch card in size but have the advantage of three or four writing surfaces per card fitting in a standard 8 x 5-inch visible card file. The index line is ruled so that the component parts of the index information on each card are in line with those on all the others, expediting the location of the information and contributing to the neatness of the file. The first column contains a catalog number for reference purposes taken from a current dealer's catalog that describes most accurately the article in question. The name, brief description, and size of the article follow. Seven additional rulings give, respectively, the location; that is, room, aisle, section, shelf and compartment; and unit price. A blank space is left between the stock record rulings and the index line for a more complete description of the article. The brief description used on the index line is repeated at the top of the folded card as an additional check when entering, and also as an index when the cards are filled and filed away for reference purposes in a vertical "blind" file, having been superseded by another active record card.

The purchase records, including date of order, number, quantity ordered, date and quantity received, unit price and total cost, are listed on a separate 6 x 4-inch card which is inserted in slits provided for it on the reverse side of the preceding pocket, so that when the pocket is folded back to expose the card bearing the record of any specific item, the purchase record card is visible at the same time. You will note that the vendor's name is not included in this record, since it is available on the quotation and purchase record card described in a preceding article in this series.* By the use of these cards purchase records are omitted from the inventory cards, as is frequently the practice on "blind" file cards, thus providing more space for stock entries, and the purchase records are available instantly over a period of years, although a number of stock record cards may have been filled and filed away.

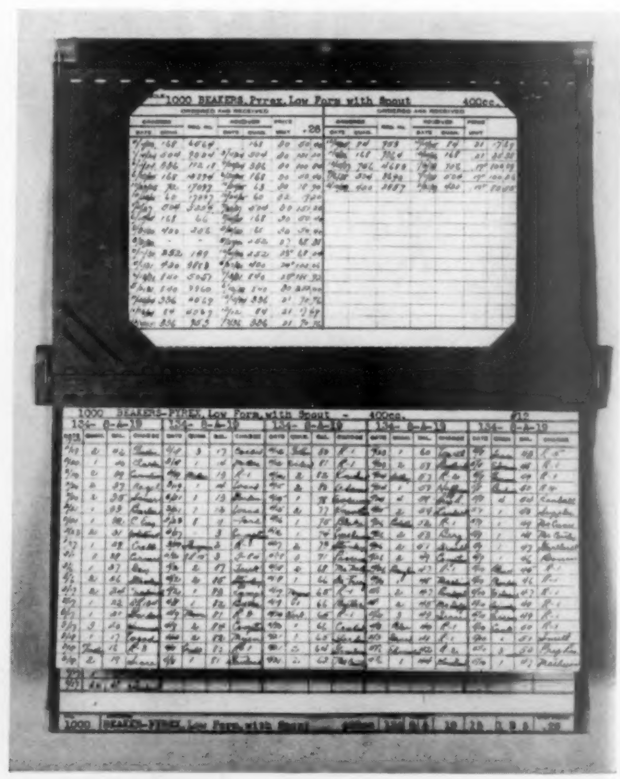
It is in order to refer here to the location record and its meaning. The location system used in all the storerooms is described in some detail on page 302 of the 1933-34 Edition of THE AMERICAN SCHOOL AND UNIVERSITY, but it will be repeated here because of its relation to the perpetual inventory. A system of figures and letters is used for location purposes. Each

* Page 469, 1939 Edition, THE AMERICAN SCHOOL AND UNIVERSITY.



Left—Tray pulled out to show arrangement of the perpetual inventory cards

Below—File pockets with inventory cards and purchase record cards



run of shelving is given a number, each elevation a letter, and numbers are assigned to each shelf with a sub-number for each compartment. A typical location is written 2 A 9.1. As all elevations in a similar position in each run of shelving are lettered and the shelves numbered identically, the attendants know that section A, shelf 9, compartment 1, will be in the same position in row 8 or any other row as it is in row 2, in any of the storerooms. As soon as he knows the key number of a given item, he has a mental picture of its location and can find it in less time than he possibly could with any straight alphabetical or numerical system. Although each storeroom has a location index, the repetition of the location on the inventory card is of advantage in several respects. Its chief value is in reference to entries being made on the perpetual inventory. Unlike a catalog number which may refer to numerous sizes of a single item, the location number when used as a stock number refers to a particular item and size. It is therefore used also as a stock number and precedes the listing of the corresponding item on each withdrawal slip. When an entry is being made on the perpetual inventory record, if the location (stock number) does not agree with the size specified, the listing is questioned and errors are thus avoided.

The several faces of the stock record card are ruled in series of four columns, the first column for the date, the second for the quantity withdrawn from stores, the third showing the free balance, and the fourth the charge. Credit for items returned, as well as new acquisitions, are appropriately entered and added to the free balance, so that the last entry in the balance column always shows the amount on hand. When entering credits or new acquisitions, the method of entering is reversed; that is to say, the source is indicated under the quantity column and the quantity with a prefix written R-36 or Cr-36 in the charge column to indicate new acquisitions or material returned for credit. This is obvious to anyone familiar with the system and reduces the number of columns required otherwise.

In the Frick Laboratory there are three points of issue in addition to the reserve storerooms. The stock record for the same item when carried in stock in any or all of the several storerooms is entered on a single card in columns having appropriate headings. The rooms as indicated in the illustration are the main delivery room (134), auxiliary delivery rooms (31 and 228), and the reserve storage (21). In addition to open stock in the reserve storage room, a column is devoted to articles in storage in original case lots such as Pyrex glassware.

In addition to the room number, the location is included in the heading for the purposes previously mentioned. The entries for withdrawals from the main delivery room being predominantly greater than from any of the other storerooms, more columns are devoted to them. For this reason those on the front face and lower inside section of the folded card are used for records of transactions originating at this distributing point. The records pertaining to the reserve stores and auxiliary delivery rooms are placed in their respective columns in the upper inner section. This conserves cards and makes the records available in the "visible" file for a greater period, since additional cards devoted entirely to records pertaining to the main delivery room may be inserted in the same pocket without interfering with the visibility and use of columns devoted to the secondary storerooms on the lower card.

Perpetual inventories of chemicals are kept for chemicals on similar cards and in the same manner as for apparatus, with the exception that, whereas there are usually several sizes of each type of apparatus, there are several grades of purity of many of the chemicals and for economy and convenience in distribution these are carried in stock and issued in bottles or other containers varying in the quantity of the substance each contains. A separate card is provided for each grade but, unlike the apparatus, the records pertaining to these several sizes of packages containing chemicals meeting the same specifications are entered on the same card under columns set aside for units containing the same quantity.

The auxiliary delivery rooms serve specific undergraduate laboratories, and the number of items carried in stock is limited to articles used in the courses served by them. The consumption as a rule is fairly constant in relation to the number of students enrolled in the courses. A perpetual inventory record in the ordinary sense is not carried for the stock in these storerooms. Entries of transfers of stock to or from these delivery rooms are made in their respective columns. At specified intervals, physical inventories are taken and the free balance adjusted. The inclusion of these inventory records is of value in giving a complete history of the movement of the various commodities. Although the materials transferred to them are considered expended as far as active stock is concerned, their free balances are taken into consideration in the preparation of yearly stock requirements. The inclusion of these stock records is also of value in preventing excessive inventories from building up, and when shortages occur in the stocks of the active storerooms these records are helpful in arranging for transfer of sufficient stock back to the active storerooms to take care of the situation.

True perpetual inventory records are kept of all transactions affecting the reserve storerooms and the main delivery room, all acquisitions, returns and withdrawals being entered for each transaction. The

8 A 19 1000 BEAKERS-PYREX, Low Form, with Spout 400cc.

DATE	QUAN.	BAL.	CHARGE	DATE	QUAN.	BAL.	CHARGE	DATE	QUAN.	BAL.	CHARGE
12/15	[illegible]	72	R-1	12/16	1	76	Nicholas	2/10	1	91	Clarke
12/15	[illegible]	73	R-1	12/18	[illegible]	75	R 3	2/10	3	90	Geology
12/15	[illegible]	74	R-1	[illegible]	[illegible]	78	R-4	2/19	1	87	Killian
12/15	1	75	Bartlett	[illegible]		82	Inv	2/22	1	86	[illegible]
12/15	1	74	Carter	1940 [illegible]	[illegible]	15	R-1	2/25	1	85	Kendall
12/15	1	73	Graef	1/8	1	16	Kellogg	2/26	1	84	[illegible]
12/15	1	72	Murphy	1/21	1	15	[illegible]	2/28	2	83	Sherwood
12/15	1	71	Miller	1/30	1	14	Kendall	3/3	2	81	Stanley
12/15	[illegible]	70	R-1	1/31	1	13	[illegible]	3/5	1	77	[illegible]
12/15	1	71	Blake	1/31	2	12	Shenk	3/10	2	76	Prep Rm
12/16	3	70	Hewitt	2/3	1	10	Axelrod	3/10	2	74	[illegible]
12/16	[illegible]	67	R-3	2/5	[illegible]	9	J-84	3/11	6	72	Cornelius
12/16	[illegible]	70	R-6	2/7	2	93	Pasner	3/13	1	66	[illegible]

Secondary Inventory Cards

free balance in each of these is therefore instantly available.

Secondary Inventory Cards

In addition to the main perpetual inventory, smaller inventory cards 6 x 4 inches in size with specifications and rulings similar to the control inventory are placed in the bins for each item and size in each of the active storerooms, and identical entries made on them.

NAME H. Pasner COURSE 305

ORDER

DATE 2-7-41 194_ FOR MATERIAL DESK NO.

LOCATION	AMT.	DESCRIPTION	SIZE	VALUE
8-A-19	2	Beakers, Pyrex, L F	400 cc	.52
1-H-21	8	Watch Glasses	100 mm	.40
6-A-H1	6 ft	Glass Rod, Soft	4 mm	.09
7-A-H2	1	Cylinder, Graduated	250 cc	1.20

PRINCETON UNIVERSITY—DEPARTMENT OF CHEMISTRY

"Order for Material" Slip

NAME H Pasner COURSE 305

CREDIT

DATE 3/27/41 194_ FOR MATERIAL DESK NO.

LOCATION	AMT.	DESCRIPTION	SIZE	VALUE
8-A-19	4	Beakers, Pyrex, L. F.	400 cc	1.04
7-A-H2	1	Cylinder, Graduated	250 cc	1.20
7-E-21	1	Flask Erlenmeyer N M C S	2000 cc	.60
5-C-104	1	Porcelain Crucible	#4	1.05
5-D-71	1	Porcelain Mortar	115 mm	.65
5-D-72	1	Porcelain Pestle	115 mm	.35

PRINCETON UNIVERSITY—DEPARTMENT OF CHEMISTRY

"Credit for Material" Slip

This may seem a duplication of work, but the resulting accuracy in the perpetual inventory records justifies the additional effort. It has been the writer's experience that the majority of mistakes in inventory records are due to inaccurate counting at the time physical inventories are made. Physical inventories are expedited by the use of these cards, since actual counting of the articles may be done over an extended period prior to the taking of the inventory, and any discrepancies between the free balance and the actual count can be satisfied. Duplicate sets of these small cards are provided and used during alternate years. On a given day the sets are exchanged, the free balance on the card for the closing year is entered on the card to be used the following year, and the previous year's cards are sent to the office.

Checking Inventory Records

The checking of the permanent perpetual inventory can then be made over a somewhat extended period without interruption to the normal entries. Another important advantage of the secondary cards is that the entries on them should agree with those on the permanent records. When they do not, by comparing them it is possible to rectify mistakes and definitely place the blame for any errors in issuing or accounting for supplies. Everyone connected with the stores system is therefore more careful and alert and, since this secondary inventory card has been used, it is surprising how few errors in inventory have occurred. This system has resulted in an appreciable conservation of supplies, because every item and unit must be accounted for.

Distinctive color charge slips are used, 6 x 4 inches in size. "Order for Material" slips are blue, "Credit for Material" slips are yellow. These are identically ruled as illustrated. In addition, a pink credit slip is used with "Do Not Enter" in open letters printed across its face. The reason for the use of this slip is that, at the time various undergraduate laboratory

NAME C J Berg COURSE Research

CREDIT

DATE 5/7/41 19_ FOR MATERIAL DESK NO.

LOCATION	AMT.	DESCRIPTION	SIZE	VALUE
	6	Beakers, Pyrex, L F	400 CC	1.56
	1	Support, Iron, Rect. Base	5¼"x9"	.75
	1	Support, Iron, Rect. Base	6 x 11"	1.10
	1	Support Rod, Iron	36"	.50
	1	Support Rod, Steel	24"	1.50

DO NOT ENTER

PRINCETON UNIVERSITY—DEPARTMENT OF CHEMISTRY

Pink "Credit for Material" Slip

courses are terminating, many similar items are being returned to stores by a large number of students who have withdrawn them in addition to the standard desk equipments. The use of this slip avoids innumerable credit entries on the perpetual inventory. When this slip is used, the individual students are credited with the value of the apparatus returned but no entry is made on the inventory cards. At the end of the day these items are sorted and a single credit is made for the accumulated total for each article on yellow credit slips across the face of which in open letters "Enter but do not Credit" has been stamped. These items are entered on the inventory.

In order to avoid the accumulation of more charge slips than necessary, a sorting box is located near the delivery windows consisting of a case open at the front with vertical divisions for each principal letter of the alphabet. During the day, when withdrawals by an individual are first made, the slip is filed in this box under the initial of his surname. Whenever he returns during the day, his previous slip, if not completely filled in, is handed him for additional entries. Thus, fewer slips are used and, at the end of the day, less sorting of the slips is required. Before the slips are transferred to the office they are consecutively numbered with a numbering machine. The entry clerk must account for the receipt of the slips as numbered. This prevents the careless handling of the slips and overcomes any disagreement between the stores attendants and the entry clerk as to whether or not a charge slip has been made out if discrepancies occur in inventory. After entries are made, the slips are filed in a card file under the names of the individuals whose signatures appear on them. They are the only detailed record of transactions kept and thus simplify the clerical work of the administrative office.

Advantage in Purchasing

The advantages of this system from the standpoint of purchasing are many. The inventory record in the main office gives an accurate case history for each article carried in stock. With the assistance of a calculating machine, the amount used over a given period can be quickly determined by adding the free balances at the beginning of the period plus acquisitions and deducting the amount on hand. This gives readily the amount used, and by again deducting the free balance the quantity to order is readily determined, subject to consideration given to possible increases in use over the period for which the purchase is to be made, and the relation of the quantity indicated to that which may result in obtaining the best quantity discount. Discussion of the method of preparing a list for quotation from the information thus obtained is discussed in an article on "Acquisition of Apparatus and Supplies" page 465, 1939 Edition, THE AMERICAN SCHOOL AND UNIVERSITY.

Special Apparatus and Instrument Control

The record of what we term "Special Apparatus" is more a permanent inventory than a perpetual one in the sense in which the latter term is generally used, in that a perpetual inventory is a collective record of a group of articles of similar specifications and size embodied in one record, whereas the one now under consideration pertains to single units with a separate card for each. However, for the purpose of this article, it may be considered a perpetual inventory in that we are dealing with perpetuating records of a group of individual articles.

In an excellent article * written by Foster Strong of the California Institute of Technology regarding the servicing of graduate and research laboratories, a system of special apparatus and instrument control is described. It is interesting to note the many points of similarity, in respect to services performed and type of records kept, between the system he describes and the one used here at Princeton. The special apparatus and instruments used in chemistry, particularly in physical chemistry, are to a considerable degree like those used in physics, so that the problem of their control offers similar problems. These two systems differ principally in type and extent of information available and in the number of forms used in registering it. Owing to the concurrent system of numerical and alphabetical indexing used in Princeton, it is possible to incorporate all the information on one card that is contained on the two cards and the cross-index used in the Pasadena system.

Preparation of the Inventory

At the time the special apparatus and instruments, then mostly in the personal custody of members of the Faculty, were cataloged, twenty years ago, a combined numerical and alphabetical system of cataloging was adopted so that reference by number or title could be made quickly and easily. All such equipment was called in and made available to all the laboratory community on the basis of need. Since then no apparatus has been permanently assigned to any individual.

With the exception of the more common articles used universally and in large quantities, all apparatus irrespective of its value was cataloged. The items were listed in alphabetical order and an identification number in numerical sequence as hereafter described was assigned to each article to secure a concurrent numerical and alphabetical arrangement when filing the apparatus record cards. Numbers from 100 to

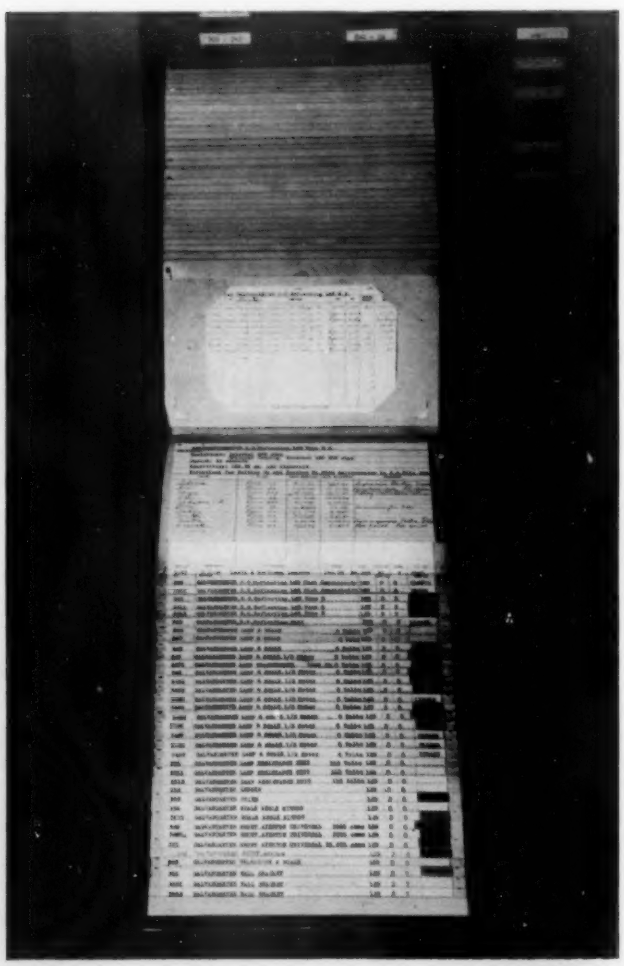
* "The Servicing of Physics Laboratories and the Managing of Physics Stores," page 476, 1941 Edition, THE AMERICAN SCHOOL AND UNIVERSITY.

999 were divided by the principal letters of the alphabet in proportion to the frequency with which they were used as the first letter in the names of the apparatus and instruments then available. For instance, the names of a greater number of scientific instruments begin with A, B, C, R, S, etc., than with I, L and Q, so that the numbers could not be advantageously divided evenly among the letters of the alphabet, but had to be divided in a ratio relative to the frequency of their use. Numbers were assigned to the articles in each alphabetic group in the order of the progression of the alphabet in their names, with unused numbers distributed between the ones used, so that later acquisitions could be cataloged in their proper numerical and alphabetical order. As an illustration, the first item, Alpha Ray Track Apparatus, was given the number 103, leaving two numbers unassigned for future use. Ammeter, Milli-A.C. 150 M.A. was numbered 106 with three numbers available between, and so on within the block of numbers prorated to the letter A. You will note under this arrangement that the basic numbers are composed of the digits, as for instance number 340 is assigned to L&N High Sensitivity Reflecting Galvanometer as illustrated. All identical instruments are given a sub-number from one up, under this filing arrangement. Thus, a similar galvanometer is numbered 3401, and so on. This permits all additional acquisitions of similar instruments to be filed as a group without using up the basic numbers unnecessarily. Each article is marked with a similar number whenever possible, by attaching a numbered aluminum tag which adds prominence to the identification, or, when this is not practical, by painting, stamping or engraving the number on a suitable place on the apparatus itself. By this means it is easy to identify the item wherever it may be.

Description of Special Apparatus Cards

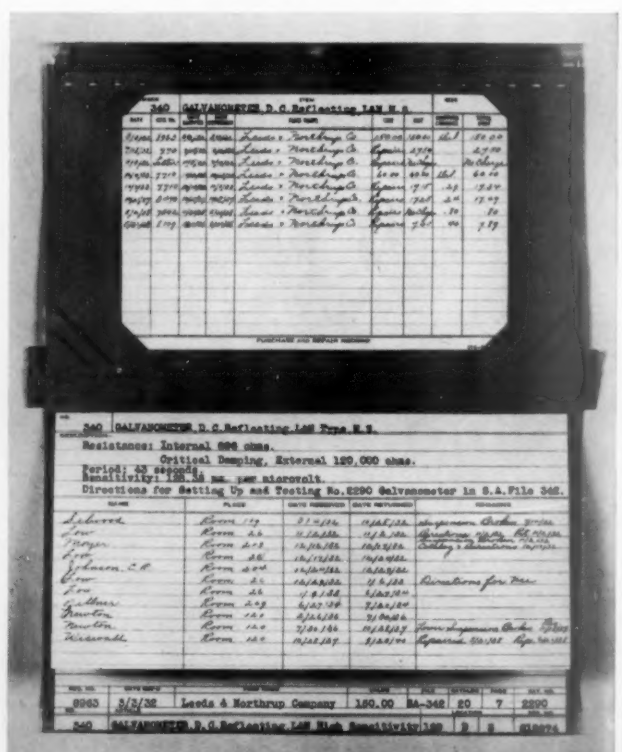
Visible index files identical with those provided for the perpetual inventory were adopted and cards of similar size and type are used with rulings suitable for this kind of information.

On the visible line of the card the number of the apparatus or instrument is entered, the name of it, permanent location in the special apparatus rooms, and the serial number of the instrument whenever it is available. On the line above is given the requisition number, the date received, the firm name of the manufacturer or the dealer's name, depending upon



Left—Tray file showing the combined numerical and alphabetical system of cataloging apparatus and instruments

Below—File pockets with special apparatus cards and purchase and repair card



NAME *Wiswall, R. H.* ROOM NO. *120* DATE *10/28/37*

is authorized to draw the following

SPECIAL APPARATUS

for use until __________

NUMBER	ARTICLE	LOCATION			RETURNED
340	Galvanometer D.C. Reflecting L+N Type R	129	D	3	9/25/40
612	Potentiometer and Bridge, Wolff	129	H	8	
6923	Resistance Box, 4 Dial, L+N 1-9999 ohms	129	N	1	

SIGNED *W. F. [illegible]*

Withdrawal Slip

whose descriptive literature is used, the value, and—of particular importance—the file number, catalog page and catalog number.

The prefix SA refers to the special apparatus information file. A vertical file is provided, with folders numbered consecutively from 100 to 999, corresponding to the basic apparatus numbers. Literature describing the equipment together with directions for use, calibration charts and any other information, including even correspondence relating to it, are filed for ready reference in the similarly numbered folder.

In addition to the repetition of the number and name at the top of the card, space is left for a short description of the apparatus that is of value to the person selecting equipment applicable to his requirements. In the body of the face of the card and continued on the under surfaces, rulings are provided having spaces with appropriate headings indicating the person withdrawing the apparatus, the place where it is to be used, the date received, the date on which it is returned to stores, and a space for remarks on repairs or alterations, recalibrations and similar information. This, together with a 6 x 4-inch "Purchase and Repair Record" card as illustrated, which is inserted in slots on the reverse side of the pocket, gives a complete history of each article. The name of the firm from which the apparatus was actually purchased is entered on the purchase record card.

The special apparatus files are located in the administrative office, where they are conveniently and readily accessible to both the persons responsible for its upkeep and all who have reasons for referring to it. These records give complete information at all times as to what apparatus and instruments are available, whether in stores or in use, and where it should be located at any given time. A visible index file is particularly useful for this type of records. The visible index lends itself to rapid location of an individual card or for use as a reference list of all the equipment. The use of the file for the latter purpose, consultation of the information pertaining to a particular item, or making entries on the cards, can be accomplished easily without removing the cards from the file. This prevents misfiling as well as loss of cards. The celluloid strip at the bottom of the pocket, in addition to protecting the exposed index line, serves another useful purpose. Transparent colored celluloid signals are inserted behind it without obscuring the typing to indicate whether an instrument is in use or is being repaired, so that it is necessary to consult only the cards without signals to select equipment that is available immediately. However, if a person requires an instrument and it is not available in stores, from the information contained on the cards a check can be made of all similar instruments to determine if one outstanding can be made available for the use of the person now requiring it. The use thus made of the special apparatus records is of great value in preventing unnecessary expenditures, for no additional apparatus will be purchased until it is demonstrated that similar equipment on hand cannot be made available or other equipment already in the laboratory cannot be used in its place.

Withdrawal Slips

In order to establish responsibility for special apparatus as well as for the assistance they give in checking outstanding equipment, withdrawal slips 6 x 4 inches as illustrated are made out by either the Curator or his assistant and signed by the person receiving the equipment. In addition, all those below the doctorate rank must have the requisitions approved by the Faculty member in charge of the project, or by either the Curator or his assistant at their discretion, in order to prevent promiscuous use of such equipment. Every effort is made to expedite the acquisition of apparatus by those requiring it. However, compliance with reasonable regulations is necessary if the welfare of the laboratory community is to be preserved and unnecessary deterioration of valuable equipment prevented. The person approving the order therefore has a responsibility to see that the article requisitioned is both necessary and suitable for the purpose intended. Whenever the Curator or his assistant believes he is not qualified to determine this, the requisition is referred to the proper Faculty member for his approval or rejection.

The withdrawal slips give the name of the person receiving the apparatus, the room number in which it is to be used, and the date withdrawn, with provision for setting a time limit for its use, and with a line at the bottom for the signature of the person approving the requisition. The remainder of the slip is ruled for the issue of a total of six items, with spaces provided for the number of the article, the specifica-

tion, and location, that is, the room number, case and shelf, with a space for entering the return date when only part of the items are returned at one time. These slips when properly filled in are presented to the attendants at the main delivery room who have access to the special apparatus storerooms. The number of the apparatus and its location as given on the slip assist the attendant in locating quickly the equipment desired. This information also is of value in replacing the equipment in its assigned space in the storerooms when it is returned.

After the material is delivered to the prospective user, the slips are returned to the administrative office, where they are filed under the name of the recipient of the equipment. This provides a record of all instruments in the custody of each individual. When a project is terminated, a check can be made quickly to see that all apparatus not required for a new project is returned to stores.

Return and Inspection of Apparatus

There should be one member of the service staff, responsible for all special apparatus, who is qualified through aptitude and experience to see that equipment is properly listed, stored and kept in serviceable condition. He also should be familiar with the application of every instrument and be able to advise the prospective user how to operate it, not only to facilitate its use but also to prevent it from being damaged. The person so responsible in our laboratory is the assistant to the Curator.

At the end of each academic year or before any member of the laboratory community leaves for any extended period, all special apparatus is checked with each individual, so that it may be accounted for and any necessary repairs made to it. At this time all such equipment for which immediate use cannot be demonstrated is returned to stores. When the possessor is to be absent for an appreciable period, only equipment that is incorporated in an experimental set-up, and instruments that may have been calibrated or have characteristics essential to it, are permitted to be retained. In such cases an identifying tag must be attached and instruments stored in an approved place in the laboratory; otherwise, when a room-by-room inspection is made, all untagged equipment and instruments are automatically returned to stores.

Whenever apparatus is returned, it is thoroughly inspected and, when necessary, it is reconditioned by the person in charge or sent to our shop or to the manufacturer for more extensive repairs as conditions or the nature of the equipment indicate. This procedure is also followed whenever difficulties with an active piece of apparatus are reported.

The writer is in agreement with the statement by Mr. Strong that "apparatus sitting idly on shelves never performed any useful research work." However, such equipment when not in active use will be serviceable for considerably longer periods if returned to its permanent location in stores than if it is permitted to remain in the laboratory, particularly one devoted to chemistry, besides being more readily available for use by some one in need of it. On the other hand, when apparatus remains unused on the shelves for long periods, effort should be made to find some useful work for it. If there is no likelihood of its being used again, some favorable disposition should be made of it and the space it occupies put to better use. As a case in point, a butter refractometer remained in stores for a long time. When attempts were made frequently to put it to use, it was always found that the index of refraction was not suitable for the type of research now conducted in our laboratory. It was finally traded in for a liberal allowance on a desirable type.

A set-up of equipment, including glassware, not in use is not permitted to remain so unless another person is to be immediately assigned to it, because valuable equipment is tied up that can be put to more immediate use, and also because it is usually necessary to rebuild it before another person can successfully use it. These are somewhat like amateur radio sets that were built in the early days of radio. It was impossible for anyone but the builder to make the set work, and frequently even he was unable to find out what was the matter with it when something happened to it. Even if a set-up is left in workable order, it seems to challenge the ingenuity of the next person assigned to it to see if he cannot improve upon its design, so frequently time and expense are saved if he is permitted to construct a new one. This is particularly true of glass apparatus.

For this reason equipment made either all or in part in the machine and glassblowing shops is not cataloged until it has been demonstrated that it is beyond the experimental stage, unless it has been constructed to an approved design and is an independent unit unlikely to be altered. Many items in their original forms are applicable only to the projects for which they are built. Such articles are not discarded but are stored in a suitable place where they may be inspected by persons who may find use for them either "as is" or after alterations. It is in connection with such equipment that the knowledge of the apparatus custodian is extremely valuable. If after a reasonable time no further use is made of such apparatus, it is disassembled and the component useful parts returned to the supply rooms.

Several kinds of storage are used for special apparatus. Electrical instruments and other fine apparatus used in the undergraduate courses in Physical Chemistry are stored in steel lockers in the Physical

Chemistry Laboratory where they are readily available.* Apparatus for demonstration purposes is stored in steel cases in the lecture preparation room.† Hot plates, motor stirrers, rheostats and other small rugged types of equipment, although classified as special apparatus, are stored in the main delivery room, where they are available more readily. Electrical and optical instruments and similarly more delicate and expensive equipment are stored in the special apparatus rooms in dustproof steel cases with glazed doors, where they are fully protected yet can be seen without removing them for the cases. These rooms are adjacent to, but separated from, the main delivery room. Heavy or bulky items such as motors, transformers, vacuum pumps and the like are stored in another room which has been designed to house equipment of this nature.

While the greater portion of the special apparatus is permanently stored in these rooms, there are a number of items that are permanently located in rooms where they are used, because of their size, necessity of permanent and accurate adjustment, or special facilities required for their operation. Such equipment includes large quartz and mass spectrographs, X-ray and electron diffraction apparatus, high-frequency furnaces, metallographic apparatus, and vacuum distillation equipment. Irrespective of their location, there is a card in the special apparatus file for them on which information pertaining to them is recorded and their location noted.

In conclusion, perpetual inventories are essential to the efficient operation of any supply system. They should be designed to preserve all essential information relative to the physical equipment of the laboratory with a minimum of time and effort and in such a manner that any desired information will be instantly available. These records should serve not only to conserve the physical and financial assets of the institution by preventing deterioration of equipment and unnecessary expenditures for it, but, of even greater importance, they should assist in placing apparatus and supplies in the hands of those who have legitimate use for them with the least expenditure of time and effort. A system of apparatus and control is usually regarded as a restraint upon the activities of the student and research personnel, whereas, if properly administered, it is of invaluable assistance by saving them time and effort in securing apparatus and supplies required by them. It has been frequently a source of gratification to the writer to find that those who were most annoyed by the necessity of submitting to the routine of the supply system while here, were the most effusive in praising it when, after departure, they encountered many difficulties and loss of time in securing similar materials in laboratories where the supply system is not as well organized.

The assistance the special apparatus inventory gives in locating and making available special apparatus that is not in stores has been discussed. The supply inventory is also equally useful. When some item is required and is not in stock in any of the storerooms, as all withdrawals have been entered, all persons who have previously secured it can be consulted and usually in this manner a sufficient quantity can be located in the laboratory to take care of immediate needs.

These records serve another useful purpose. It sometimes happens that similar research is conducted at different institutions and the question arises as to who is entitled to the credit for a new discovery or an improved technique. The supply records if preserved are of considerable value in establishing priority as the name of the person and the date he secured apparatus and supplies used in the experiment can be established, and the withdrawal slips bearing his signature and the date can be produced to substantiate such claims. Such evidence has been of use, in the Frick Laboratory, in establishing the date of conception in patent applications. Many other uses of these records, the value of which more than justifies the time and effort devoted to them, could be cited.

* Page 442, 1937 Edition, The American School and University.
† Page 446, 1937 Edition.

ALBERENE STONE CORPORATION OF VIRGINIA

Quarriers and Fabricators of Alberene Soapstone
Virginia Alberene Stone, Black Serpentine and Tremolite Green

419 Fourth Avenue, New York, N. Y.

Quarries and Mills at Schuyler, Va.

BRANCHES

Atlanta, Ga.
Boston, Mass.
Chicago, Ill.
Cleveland, Ohio
Dallas, Texas
Little Rock, Ark.
Los Angeles, Cal.
Newark, N. J.
New Orleans, La.
Philadelphia, Pa.
Pittsburgh, Pa.
Richmond, Va.
Rochester, N. Y.
San Francisco, Cal.
Washington, D. C.

ALBERENE SOAPSTONE

Natural quarried stone of medium hardness, blue-gray in color, produced and fabricated for more than 50 years; used in increasing quantities for:

- **Table Tops and Backs**
- **Reagent Shelving**
- **Fume Hoods, Gutters**
- **Sinks, Drainboards**
- **Tanks and Tank Linings**
- **Toilet Partitions**
- **Shower Compartments**
- **Interior and Exterior Trim**
- **Door and Window Sills**
- **Fireplace Linings, Hearths**
- **Spandrels**

ALBERENE TREAD STOCK

Selected stone of extreme hardness, reserved exclusively for Stair Treads, Landings, Platforms, and Flooring. Tests show an abrasive hardness factor of 25-40, the highest durability factor on the National Bureau of Standards scale of any natural stone commercially used for these purposes. Its siliceous nature makes it non-slip wet or dry.

GRADE 25 ALBERENE

Variety of extremely hard stone, especially selected for laboratory working surfaces. Takes a permanent high sheen when rubbed down with oil. Abrasive hardness factor, 25-40, National Bureau of Standards tests.

ALBERENE BLACK SERPENTINE

This natural stone is becoming extremely popular. Its great resistance to weather action makes it desirable for exterior as well as interior work. When sand-blasted (as in spandrels) the fine tracery of the designs stands out against the polished black surface. Abrasive hardness factor, 30-45, National Bureau of Standards tests.

ALBERENE TREMOLITE

An interesting addition to the line. In honed finish, shows clear white markings. Two varieties, one polishes to a dark green, the other to a dark blue-gray. Abrasive hardness factor, 25-40, National Bureau of Standards tests.

PHYSICAL AND CHEMICAL PROPERTIES

All grades of Alberene Stone are homogeneous and finely granular in all directions, dense and non-stratified, chemically resistant, impervious and non-staining. Alberene soapstone is easily machined—bored, slotted, grooved, tongued, turned—without splitting or spalling. Use of thin sections (7/8 in.) makes for economy.

METHOD OF CONSTRUCTION

Alberene laboratory fixtures are practically one piece structures of solid stone. Table top slabs are united by a practically invisible joint employing a strip of non-corrosive metal cemented in grooves, with abutting slab edges sealed with acid-proof cement. Fume hoods, sinks and tanks are assembled with tongue-and-groove joints held by hidden bolts and nuts and cemented—permanently gas and liquid tight.

SERVICE IN DESIGN AND INSTALLATION

Every laboratory of major importance equipped in the past 50 years has used Alberene soapstone wholly or in large part. Out of this experience the company offers an advisory service, freely available to school authorities and architects.

MANUFACTURING FACILITIES

Quarries and mills at Schuyler, Virginia, are the largest in the world devoted exclusively to the production and fabrication of special purpose stone.

Section of Chemical Engineering Laboratory, Rensselaer Polytechnic Institute, Troy, N. Y.

Alberene Stone Stair Treads and Platforms in Woodrow Wilson High School, Washington, D. C. Nathan C. Wyeth, Municipal Architect

GENERAL CERAMICS COMPANY

Manufacturers of Acid-Proof Chemical Stoneware, Laboratory Equipment

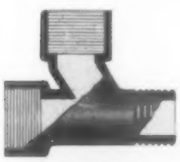
Keasbey, New Jersey

New York   Buffalo   Los Angeles   Portland   San Francisco   Seattle   Tacoma   Spokane   Montreal

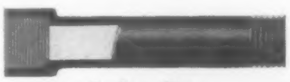
GENERAL CERAMICS COMPANY
CHEMICAL STONEWARE

The Chemical Stoneware Division of General Ceramics Company makes a complete line of acid-proof chemical stoneware equipment for chemistry and physics laboratories in educational and research institutions, for general industrial chemical purposes, and for hospitals, electro-plating plants, newspapers, photo-engraving shops, and other establishments where corrosive fluids are used.

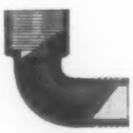
General Ceramics Chemical Stoneware Laboratory Equipment is widely used in educational institutions throughout the country. In fact, a list of the colleges and universities with chemistry laboratories equipped with General Ceramics Chemical Stoneware is practically a roster of our leading institutions of learning, including among many others Yale, Harvard, Vassar, Radcliffe, Duke, Pittsburgh, Wesleyan, Lehigh, Tulsa, Toledo, Berea, Purdue, Vanderbilt, McGill, California Institute of Technology, and the Universities of Maryland, Illinois, New Hampshire, Connecticut, Indiana, Pennsylvania, Ohio, Wisconsin, Nevada, California, and California at Los Angeles. General Ceramics equipment is used also in such buildings as the Walter Reed Hospital in Washington, the Curtis Publishing Company Building in Philadelphia, and in New York, the Times Building, Metropolitan Life Building, and United States Assay Office.



TY Fitting



Socket Pipe



Quarter Bend

The General Ceramics line of stoneware equipment includes laboratory sinks, drain lines and fittings, sumps, fume ducts, pumps, ventilating fans, and countless other items.

Description

General Ceramics Chemical Stoneware is a dense granite-like material with an attractive glazed surface. Both the glaze and the body of the ware are completely impervious to all acids and other chemicals, excepting hydrofluoric acid. The surface glaze is an integral part of the ware itself and therefore free from crazing and cracking. General Ceramics ware is mechanically strong, leakproof, and easy to keep clean, and it cannot contaminate the chemicals handled. It lasts indefinitely and there is no upkeep or replacement expense.

Laboratory Sink with integral back and side. Can be furnished without back and side in various types and sizes as required

Laboratory Sink with double drainboard. Can be furnished also without the integral back, with single drainboard (either right or left), and with details of construction as required

Engineering Service and Catalogues

Our Engineering Department will gladly assist in selecting the right stoneware equipment for any requirements. We cooperate in laying out laboratories and other buildings where corrosive products are handled, also in the design of special chemical apparatus. New bulletins on General Ceramics Laboratory Sinks and on Acid-Proof Pipe and Fittings will be furnished on request.

Specifications

Specifications should read as follows: "All parts of this installation subject to the action of acids or acid wastes are to be made of high-grade acid-proof chemical stoneware manufactured by the General Ceramics Company of New York."

MAURICE A. KNIGHT

Acid, Alkali and Corrosion Proof Chemical Stoneware

227 Kelly Avenue, Akron, Ohio

55 West 42nd St., New York, N. Y.
618 Fidelity Bldg., Cleveland, Ohio
903 United Bldg., Niagara Falls, N. Y.

314 Stephenson Bldg., Detroit, Mich.
1934 Gravois, St. Louis, Mo.

203 N. Wabash Ave., Chicago, Ill.
1033 Merchants Exchange Bldg., San Francisco, Calif.
3465 Marlowe Ave., Montreal, Quebec, Can.

PRODUCTS

Acid Waste Pipe and Fittings
Acid-Proof Fume Ducts
One-Piece Laboratory Sinks
Acid-Proof Table Troughs
Neutralizing Sumps
Tanks, Jars, Filters, etc.

SOME INSTALLATIONS

Akron University
McGill University
Purdue University
Ohio State University
Brooklyn College
Princeton University
Northwestern University
University of Arkansas
University of California
University of Washington
University of West Virginia
Mellon Institute of Industrial Research

KNIGHT-WARE

Knight-Ware is an improved ceramic material that is dense, tough and wholly inert to the action of chemical solutions or gases, weak or strong, hot or cold (Hydrofluoric acid and hot caustic solutions excepted). Its acid-proof quality does not depend upon any glaze or surface treatment. "It is the body itself" that is entirely acid-proof. Knight-Ware equipment, properly installed, is trouble-free and permanent.

LABORATORY SINKS

Knight-Ware sinks are custom-made to specified measurements without extra cost. The one-piece construction, smooth surfaces, rounded corners and acid-proof quality mean a freedom from leaks and a cleanliness that is permanent. Splash backs, drainboards, aprons and outlets of several styles may be had as integral parts of the sink. Bottoms are sloped to insure complete drainage. The finish is a rich brown salt glaze that will not stain or peel.

ACID WASTE PIPE AND FITTINGS

Knight-Ware pipe and fittings are made in standard designs in any bore from 1 to 60 inches and straight lengths up to 5 feet. Special pieces to fit unusual places or to eliminate extra joints are available at low cost. Knight-Ware pipe is light in weight, strong and acid-proof.

Joints, packed and poured to our specifications, are tight and lasting.

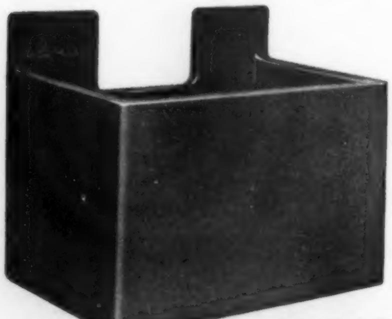
KNIGHT-WARE FUME DUCTS

Ventilating pipe is available in round or rectangular shapes in bores up to 60 inches and with bell and spigot, flanged or plain butt end connections. Specify Knight-Ware for lasting protection.

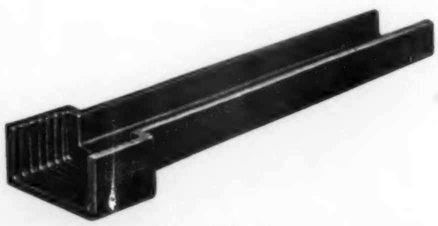
SERVICE

If you are planning a new laboratory or modernizing your present one, we offer our knowledge and practical experience gained from scores of Knight-Ware installations.

Our fully illustrated Laboratory Equipment catalog will be sent upon request.



Type 238 End Table Sink



275A Table Trough

268 Knight-Ware S-Trap with Cleanout

THE UNITED STATES STONEWARE CO.

Works (Since 1865): Akron, Ohio — NEW YORK OFFICE: 60 East 42nd Street

LOS ANGELES: Hollingsworth Building — CHICAGO: 20 N. Wacker Drive — SAN FRANCISCO: 116 New Montgomery Street

ACID-PROOF CHEMICAL STONEWARE LABORATORY SINKS

"U. S. **Standard"** Acid-Proof Sinks are widely used in laboratories of universities, schools, hospitals and industrial companies.

The construction is **one-piece,** without seams or joints. The material is non-porous and non-absorbent. The corners are well-rounded and the surface smooth. Special sizes can be made to fit any desired space.

Glaze—Our exclusive "Hy-Gloss" salt glaze has a high lustre, dark brown finish and is an integral part of the body itself.

Guarantee—Our products are unconditionally guaranteed to be acid, alkali and corrosion proof throughout the body, with or without the salt glaze.

Bulletin—Write for Bulletin No. 505 giving full information.

Other Products—Laboratory Table Troughs, Hemispherical Sinks, Sumps or Dilution Basins, Kjeldahl Equipment, Gas Generators, Laboratory Chlorine Cells, Suction Filters, Acid-proof Jars and Tanks, Burner Guards, Laboratory Jar Mills, Funnels, Exhaust Fans, etc.

ACID-PROOF PIPING

Our Acid-Proof Chemical Stoneware Pipe and Fittings are made of de-aired (vacuumized) clays. All pipe lengths are guaranteed straight, even and perfectly rounded, thus facilitating erection. In the bell-and-spigot type, the hubs are all 4" deep and both the spigot and hub ends are deeply corrugated. Every piece is accurately moulded and as true to dimensions as can be made by master-craftsmen highly skilled in the ceramic art. The joints may be sealed with our "CALKTITE" Acid-Proof Caulking Compound and on special order, we can furnish B&S Piping to fit our patented "FLEXLOCK" Rubber Joints.

Would you like us to send you a copy of this new Bulletin No. 551 on Acid-Proof Piping just published by America's oldest and largest manufacturers of Acid-Proof Chemical Stoneware? It is the most complete and comprehensive treatise on this subject ever issued. Nowhere else can you find such a wealth of engineering and technical data,—so much authoritative information on the most modern pipe caulking methods, installation technique, etc. Dimensional tables are complete for all standard fittings.

You will want to keep this new Bulletin handy for aid in the design and layout of piping installations, where corrosive solutions and gases are to be handled.

ACID-PROOF SINKS WITH INTEGRAL DRAINBOARDS

(One-piece)

Fig. 533-ASP (with Countersunk Outlet to take Metal Plug).

Fig. 533-BSP (with Integral Nipple Outlet and Removable Strainer).

Fig. 533-CSP (with Integral Nipple Outlet and Built-in Lute Trap).

Size No.	B	C	A	E	M	N	P	R	Shipping Wt., Lbs.	Code Word
307	18	14	7	8	37½	16½	8⅞	18	197	Tong
312	20	16	7	10	39¾	19	9⅛	18	285	Tope
313-A	24	18	8	10	43¾	21	10⅛	18	348	Tory
315	30	20	8	10	49¾	23	10⅛	18	410	Tuch

Sinks are made with drainboards at right hand or left hand. Special end table sinks can be made up with back cut out for trough drainage. Corner sinks with double integral back and sinks without integral backs can also be supplied.

Fig. 536-ASP (with Countersunk Outlet to take Metal Plug).

Fig. 536-BSP (with Integral Nipple Outlet and Removable Strainer).

Fig. 536-CSP (with Integral Nipple Outlet and Built-in Lute Trap).

Size No.	B	C	A	E	M	N	P	R	Shipping Wt., Lbs.	Code Word
507	18	14	7	8	54	16½	8⅞	18	284	Trew
512	20	16	7	10	56	19	9⅛	18	402	Trig
513-A	24	18	8	10	60	21	10⅛	18	477	Trow
515	80	20	8	10	66	23	10⅛	18	546	Tude

Special end table sinks can be made up with back cut out for trough drainage. Corner sinks with double integral backs and sinks without integral backs can also be supplied.

THE EATON-DIKEMAN COMPANY

Manufacturers of Filter Papers

Mount Holly Springs, Penna.

LABORATORY FILTER PAPER FOR SCHOOLS, COLLEGES AND INDUSTRIES

FOR USE IN HEAVY AND LIGHT FUNNEL WORK, FILTER PRESSES AND FILTER MACHINES

E & D QUALITATIVE FILTER PAPERS

The Eaton-Dikeman Company, established in 1893, is today the world's largest manufacturer of quantitative, qualitative, and industrial filter papers; carrying in stock more than ninety grades of a quality that is dominated by the uniformity and purity that is found only in papers processed under a strict laboratory control and in a locality famous for the purity of its water and freeness from industrial and aerial pollutions.

The Eaton-Dikeman trademark assures you of a filter paper that is made from pure spring water free from chemicals and salts, that, if present, would prove harmful to many operations.

Eaton-Dikeman laboratory filter papers are sold by all laboratory supply dealers under their own special labels, as well as E & D labels. To be sure of obtaining E & D Quality, it is best to ask for the E & D label.

The qualitative grades are sixteen in number and are best described in our Descriptive Booklet No. 1, which we shall be glad to send you on request.

Below are listed the physical characteristics of the most popular qualitative grades for educational requirements.

NEW FILT ANALYTICAL PAPERS

Our NEW FILT analytical grades, which we developed sometime ago, have been used by chemists the world over, giving excellent results. They were created to replace the foreign single-acid washed papers to be used for any analytical procedure where a strictly double-acid washed paper is not necessary. They are made of the very highest quality of pure cotton fibre and are specially treated and processed to insure a high degree of purity and a low ash weight. The NEW FILT grades, Nos. 1, 3, and 4, have an ash weight the equivalent of any single-acid washed imported paper.

NEW FILT papers have been approved by many testing laboratories and are being used in industrial laboratories throughout our country, Canada and Mexico.

Our Descriptive Booklet No. 2, useful as a laboratory handbook for analytical filtrations, describes these grades. A copy will be sent to you on request.

E & D FOLDED FILTER PAPER

Uniformity and purity, plus precision and speed make E & D folded papers the international standard.

The grades described below are stocked in all standard sizes 12.5 cm. to 60 cm.

The No. 192 grade is rapid, yet retentive.
No. 193 is medium fast, very retentive.
No. 195 is very rapid.
The No. 522 grade is highly retentive, good for general purposes.

E & D folded filter paper retains the fold in the funnel and the apex is full rounded, permitting an even distribution of the load, thereby preventing breakage at this point.

Packed 100 in a box. Samples sent on request. Ask for Descriptive Booklet No. 1.

E & D Qualitative and Quantitative papers are packed 100 circles to a box all sizes up to 20" diameter.

E & D Lining Paper, Bibulous Paper and Filter Paper clippings are on stock.

OUR DESCRIPTIVE BOOKLETS NOS. 1, 2, 5 WILL GIVE YOU A COMPLETE FILE ON LABORATORY FILTRATIONS. SENT GRATIS ON REQUEST

PHYSICAL CHARACTERISTICS OF MOST POPULAR LABORATORY GRADES

Grade	Color	Surface	Texture	Rapidity cc per Min.
607	White	Smooth	Med. Close	35-50
609	White	Smooth	Med. Close	30-45
612	White	Embossed	Med. Close	20-35
613	White	Smooth	Very Close	15-35
615	White	Creped	Fairly Open	75-150
617	White	Creped	Open	150-250
619	Gray	Creped	Fairly Open	75-150
620	Gray	Embossed	Fairly Close	45-70
629	White	Smooth	Med. Close	50-75

Note: Rapidity is number of cubic centimeters of distilled water filtered per minute in a 4" 60° funnel.

ASHLESS FILTER PAPER

FOR EXACT QUANTITATIVE ANALYSIS

PURITY
PERFORMANCE

ACCURACY
UNIFORMITY

DOUBLE ACID WASHED WITH HYDROCHLORIC AND HYDROFLUORIC ACIDS

The experience of twenty years spent in the manufacture of filter papers plus modern research and engineering have produced EATON-DIKEMAN double acid washed filter papers—these grades of filter paper have an ash weight comparable to any similar grade of foreign manufacture, a fact which may easily be attested by your experience and reports of reliable testing concerns. We invite you to make this test for yourselves. We will gladly send samples on request.

No. 840—Double acid washed with HCl and HF— to extract siliceous and ligneous matter. This grade possesses a very low ash and a high degree of retention, together with a proportionately rapid filtering speed. Used for general quantitative work, retaining $BaSo_4$ precipitated hot; crystalline precipitates, etc. Vacuum may be used in conjunction with a platinum support.

No. 841—Double acid washed with HCl and HF, possessing rapid filtering speed and is thus well adapted for gravimetric procedure involving gelatinous difficulty filtered precipitates. The ash weight is low. Used in quantitative determination of Al, Fe, Si, etc.

No. 842—Double acid washed with HCl and HF, possessing a high wet strength and very close texture, making this a suitable paper for quantitative filtrations involving the use of a vacuum. For the retention of the finest precipitates in quantitative procedure.

MERCK & CO. Inc.

Rahway, N. J.

New York · Philadelphia · St Louis   **In Canada:** Montreal · Toronto

In school and college laboratories there is a constant need for laboratory chemicals which conform to rigid standards of purity and reliability.

For more than three generations, the name MERCK has been identified with fine chemicals. Merck & Co. Inc., pioneered in the establishment of definite standards for Reagent and C.P. grades of chemicals. During succeeding years Merck has kept pace with the advance of science by supplying the chemicals essential to new discoveries and their industrial development and application.

MERCK

MERCK

Laboratory Chemicals

The unvarying quality and dependability of Merck Laboratory Chemicals are the result of a traditional insistence on the highest standards for all products bearing the Merck label.

The Merck Laboratory Chemical line now includes more than six hundred different products. Because of the variety of forms and grades which we offer, there is practically no requirement for quality or price which we cannot meet satisfactorily.

THE STORAGE OF FINE CHEMICALS

Because improper storage of fine chemicals results in the loss of thousands of dollars, due to spoilage, we list here some of the chemicals which are affected by extremes of temperature. The following are decomposed or otherwise affected by hot or cold weather:

SUMMER—Acid Citric dries out and may cake; Acid Sulfurous loses strength; Ammonium Carbonate loses ammonia; Ammonia Water loses strength and may blow up; Copper Sulfate dries out; Hydrogen Peroxide deteriorates, may blow up; Iron Sulfate (ous) dries out; discolors in moist air; Sodium Sulfate Crystals dry out and lose weight in dry air; melt at summer temperatures.

WINTER—Acid Phosphoric U.S.P. Syrupy 85% may crystalize if stored in the cold for a long time; Lanum breaks up when frozen, water content separates.

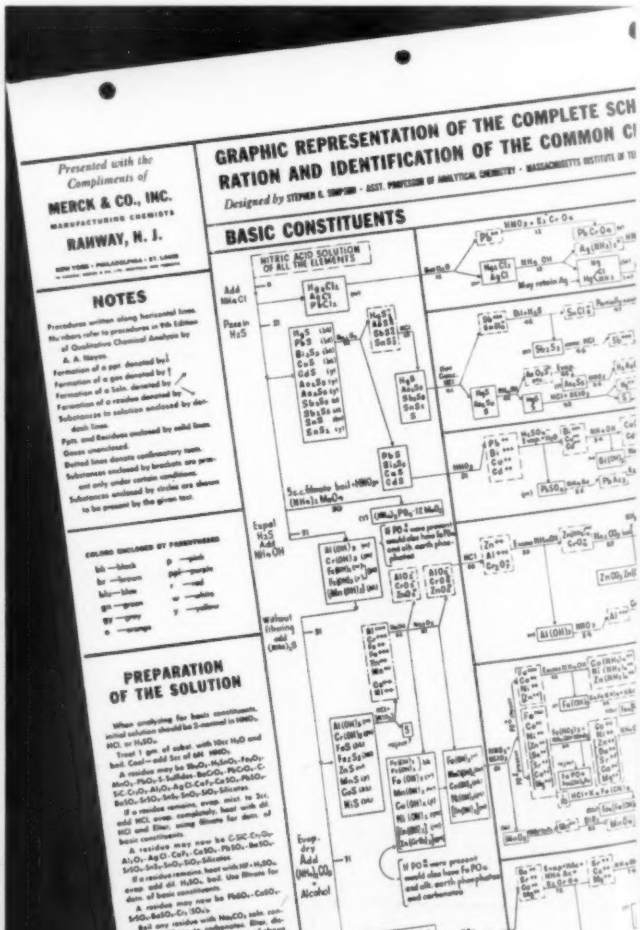
Moisture also is a factor affecting the storage of many laboratory chemicals. Listed below are chemicals which are deliquescent or hygroscopic:

Acetamide
Acid Arsenic Reagent
Acid Chromic
Acid Monochloroacetic
Acid Silicotungstic
Acid Trichloroacetic
Aluminum Chloride N.F.
Aluminum Nitrate
Ammonium Acetate
Ammonium Fluoride
Ammonium Thiocyanate
Calcium Bromide
Calcium Chloride Anhydrous
Calcium Chloride Crystals
Calcium Nitrate
Chromium Trioxide
Cupric Bromide Reagent
Gold Chloride Acid Brown
Gold Chloride Acid Yellow
Iodides (most forms)
Iron Chloride (ic) Crystals
Iron Chloride (ous)
Iron Nitrate (ic)
Iron and Ammonium Citrates Brown
Iron and Ammonium Citrates Green
Lithium Bromide
Lithium Chloride
Lithium Salicylate
Magnesium Bromide
Magnesium Chloride
Magnesium Nitrate
Manganese Sulfate
Mercury Nitrate (ic)
Phosphorus Pentachloride Reagent
Potassium Acetate
Potassium Carbonate
Potassium Thiocyanate
Sodium Arsenate N.F.V. Crystals
Sodium Hypophosphite
Sodium Sulfide
Sodium Thiocyanate
Zinc Chloride

The two charts pictured (in reduced sizes) on this page and the following page have been found extremely helpful by chemistry students. Copies are available without charge to any chemistry class. Let us know the number of each required, and we shall be glad to supply them with our compliments.

QUALITATIVE ANALYSIS CHART

The separation and identification of basic and acidic constituents are fundamental to chemical science and progress. The **Qualitative Analysis Chart** illustrated below will be found convenient and useful to research and industrial chemists, and to students.



Recent Advances in the Packaging of
MERCK LABORATORY CHEMICALS

For a number of years, the Merck Package Development Department, in cooperation with the Merck Research Laboratories, has been perfecting many new types of containers for Merck Chemicals. We can refer here to only a few of the important advances which have been made:

THE AMBERLITE BOTTLE

Many corrosive solid chemicals, formerly packed in glass-stoppered bottles, are now packaged in wide-mouthed screw-cap **Amberlite** bottles. Caps are of inert molded material, and do not deteriorate. Several types of liners make it possible to pack all solids in these dustfree containers. **Amberlite** bottles are lower and lighter—even in the larger sizes. The sloping shoulders permit easy removal of contents.

THE POUR-CLEAN BOTTLE

The **Pour-Clean** bottle, developed by Merck, embodies several features never before found in bottles intended for liquid chemicals. It has a pouring lip which is protected against dust and contamination by a molded plastic cap, unaffected by age or continued use. The lip enables chemicals to be poured without "gurgling."

SENSITIVITY CHART

The chart (Illustrated above) showing the **"Sensitivity of Qualitative Reactions,"** will be found valuable as a companion piece to the Merck **Qualitative Analysis Chart.** Containing a vast amount of useful information in concise form, it should be conveniently available in industrial, research, and college laboratories.

PACIFIC FOUNDRY COMPANY LTD.

551 Fifth Ave.
New York

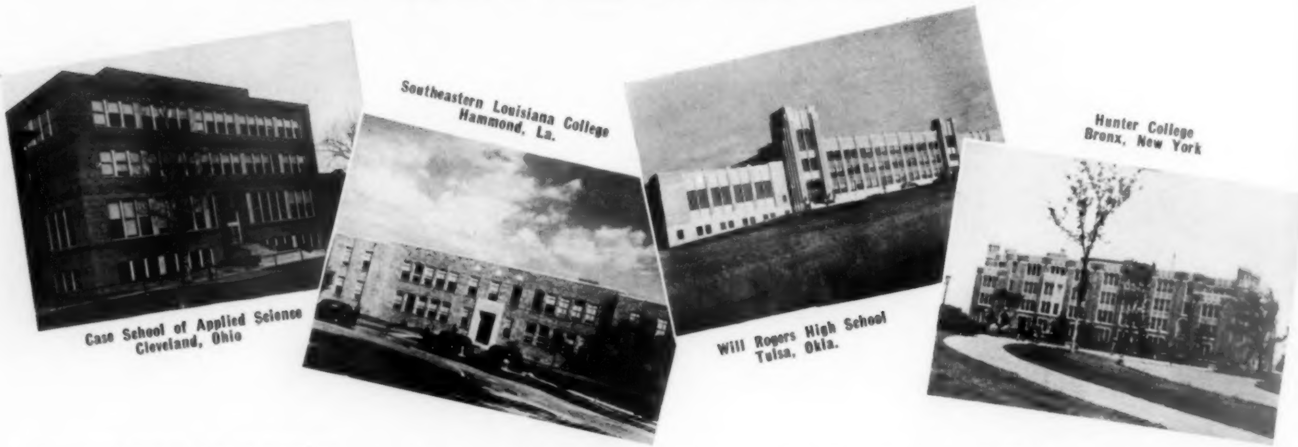
3100 Nineteenth St., San Francisco

(AGENTS IN PRINCIPAL CITIES)

1400 So. Alameda St.
Los Angeles

YOUR LABORATORY PLUMBING AND VENTILATING
COMPLETELY NON-CORROSIVE
For All Acids* and Fumes

INSTALLATIONS IN LEADING SCHOOLS AND COLLEGES



Case School of Applied Science
Cleveland, Ohio

Southeastern Louisiana College
Hammond, La.

Will Rogers High School
Tulsa, Okla.

Hunter College
Bronx, New York

WHAT CORROSIRON IS: An iron alloy, having a silicon content in excess of 14.25%, manufactured only by Pacific Foundry Company. A homogeneous alloy requiring neither treatment nor surface coating.

CHEMICAL PROPERTIES: CORROSIRON shows zero rate of corrosion when suspended in nitric acid or in nitrous fumes (two of most powerful corrosive agents known). Infinitesimal corrosion rates with all other acids* shown by tests by government and private agencies. Confirming, detailed data available on request.

WHERE USED: In high school, university, hospital and industrial laboratories for plumbing and fume exhaust systems in practically every state in the Union.

ITEMS AVAILABLE: CORROSIRON drain pipe and fittings (E. H. Std.) in all sizes. CORROSIRON fans, sizes 3 to 15 inch. Special acid handling equipment designed or furnished to your design.

REPUTATION: CORROSIRON, one of the first high silicon irons, has been manufactured and in satisfactory service for over 20 years. For more than a quarter century, Pacific Foundry Company has been building a reputation for quality rather than for quantity of the specialties which it manufactures. Full details of acceptance by Federal, State and school authorities on request.

USED FOR: Drain pipes and fittings, fans, laboratory acid digestion apparatus, sinks and other plumbing and fume exhaust systems.

WRITE FOR FOLDER: CORROSIRON will save you money on silicon iron installations. Write or wire for bulletins giving roughing-in dimensions, complete chemical and physical properties and list of installations in your vicinity.

* Except hydrofluoric.

SPECIFICATION

All acid waste and acid vent piping shall be of approved high silicon cast iron bell and spigot type and shall contain: Not less than 14.25% and not more than 15% silicon; total carbon content below 1.12% and above .50%, manganese below .50%; sulphur below .05%

CORROSIRON

MADE IN U.S.A.

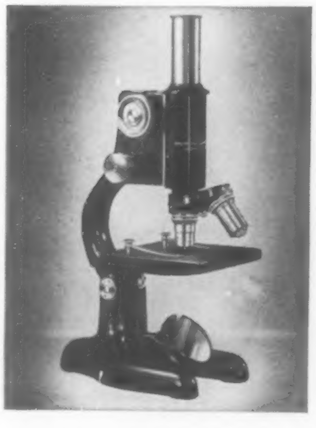
HIGH SILICON ACID RESISTING IRON

BAUSCH & LOMB OPTICAL COMPANY

655 St. Paul Street, Rochester, N. Y.

New York — Chicago — Boston — Los Angeles — San Francisco
London, England — Toronto, Canada

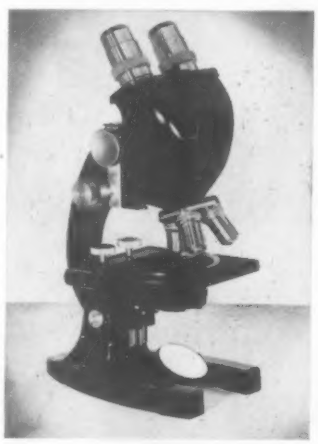
FB MICROSCOPE



Microscope FB is especially designed and built for elementary science work and its price, based on quantity production, is in line with the most restricted budget. It is ruggedly built to stand many years of hard class room usage. Its optics are of the same precision type that characterize the more expensive research type of instrument. Features include standard size, coarse and fine adjustments, double revolving nose piece, standard objectives and eyepieces, disc diaphragm, solid Bakelite stage, concave mirror, etc. Velvety black, wear-resisting finish—Chromium plated parts.

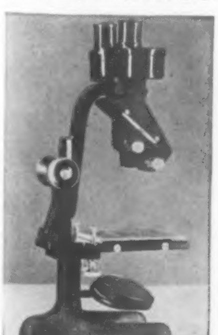
Microscope F is similar to the instrument above but fine adjustment has been eliminated in the interests of economy. Magnifications range from 20 to 310 diameters.

CTA MICROSCOPE



This microscope is especially adapted for advanced Biological work, for Medical Study and Diagnosis and as a general purpose microscope in universities. Has inclined binocular body (interchangeable with monocular tube for photomicrography) with parallel eyepiece tubes. Built-on mechanical stage holds slides 50 x 75 mm., permitting examination of the entire area. Abbe Condenser 1.25 N.A. in full ring mount is in rack and pinion substage. Revolving, dustproof nosepiece, centered and parfocalized at the factory. Optical equipment of uniform high excellence includes achromatic and fluorite objectives.

K TYPE BINOCULAR MICROSCOPE



The great popularity of the K Type Binocular Microscope has prompted us to offer the Model "K" for schools and universities. Its range of magnifications of from 7X to 150X especially suit it for biological, bacteriological and paleontological work. An interesting feature of this series is the new dustproof Shuttle nosepiece, specially made for this series. This microscope gives stereoscopic, three dimensional effect. Image is upright and unreversed. Exceptionally wide field.

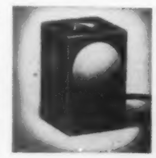
B & L REFLECTOR LAMP

This lamp fills a definite need in work with both the monocular or binocular non-objective microscope and the stereoscopic wide field microscopes. Elliptical mirror with adjustment provides diverging, parallel or converging light.

Jointed arm mounting permits all-angle illumination above or below stage. With adjustable transformer, light intensity is exactly adjustable to the work in hand.

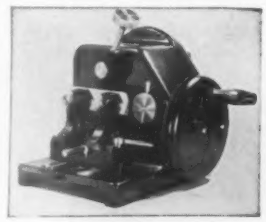
OTHER MICROSCOPE LAMPS

Other B&L Microscope Lamps are available for various purposes in the school laboratory. The two shown herewith are (right) a substage lamp and (left) the Universal Microscope Lamp.



B & L MICROTOMES

The B & L line of Microtomes is most complete. The Minot Automatic Rotary Microtome illustrated is ideal for rapid serial sectioning, cutting section with accuracy down to 1 micron in thickness. Feeding mechanism operates automatically. Dustproof operating mechanism. Catalog D-21 describes the complete line, including the new Precision Automatic Microtome—motor driven.



B & L SPECTROGRAPHS

The complete B&L line of Spectrographic Equipment covers every need. Models range from the Bunsen Spectroscope (illustrated) for elementary class room work to the large Littrow Spectrograph for examining complex alloys. Each is designed and built with the utmost care and due to our great experience in this field represents all of the best features necessary for both teaching and laboratory research. Catalogs D-221 and D-20 give complete detail.

QR MAGNIFIER

This is an adjustable tripod type magnifier which is placed directly over the specimen. Has double lens, magnifying 7.5X. Useful for the school laboratory. Other magnifiers for various purposes are available.

SEND FOR CATALOGS

For complete information on Laboratory Microscopes send for Catalog D-185. For information on B&L Balopticons see page 275 this catalog. Remember the instruments listed on these pages are but a small part of the B&L Line. If you have need for information on any optical products whatsoever, Bausch & Lomb will gladly be of service to you.

SPENCER LENS COMPANY

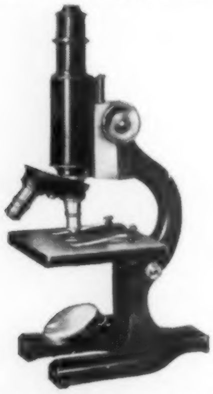
Buffalo, New York

Manufacturers of

Microscopes—Microtomes—Optical Measuring Instruments
Delineascopes—Photomicrographic Cameras

BRANCH OFFICES

New York . Chicago . Washington . Boston . San Francisco . Los Angeles . Dallas . Columbus . St. Louis . Philadelphia . Atlanta



STUDENT MICROSCOPE No. 74

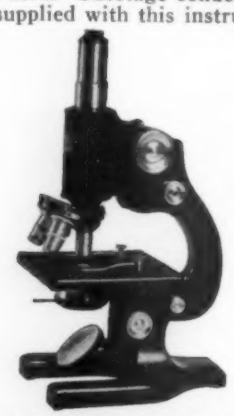
A low cost, standard size, quality instrument for classroom work requiring magnifications up to 360 diameters. Equipped with coarse adjustment only. Solid bakelite stage, 110 mm. x 105 mm., will not warp and is resistant to all ordinary laboratory reagents. Revolving disc diaphragm is easily rotated at edge of stage. Concave, adjustable mirror of standard diameter, is mounted in an adjustable fork. Substage condenser cannot be supplied with this instrument.

ELEMENTARY LABORATORY MICROSCOPE No. 66

This standard size microscope for biological laboratory work has the same high quality optics and mechanical parts found on the more expensive instruments. Equipped with coarse and fine adjustment. Substage condenser cannot be supplied with this instrument. Durable, bakelite stage 110 mm. x 105 mm. Sturdy, revolving disc type diaphragm under the stage is easily manipulated at edge of stage.

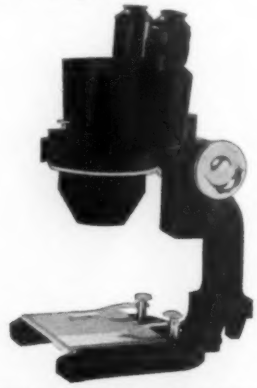
ROUTINE LABORATORY MICROSCOPE No. 63

This microscope meets the most rigid specifications for a sturdy, durable and precision laboratory instrument. Designed to accommodate a substage condenser for greater magnifications. Highest quality optical system. Has both coarse and fine adjustment. Durable bakelite stage 125 mm. square. An iris diaphragm, located under the stage, insures satisfactory modification of illumination for low power work.



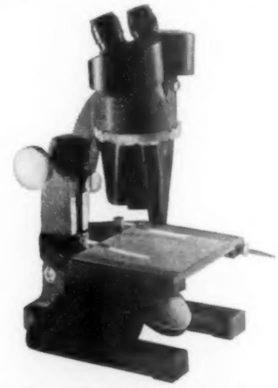
ADVANCED LABORATORY MICROSCOPE No. 33H

Designed for almost any type of microscopic observation because it permits the use of all standard Spencer microscope accessories. Has the following exclusive Spencer optical and mechanical features: (1) Balanced Optical System, (2) Dual-Cone Nosepiece, (3) Fork-Type rack and pinion Substage. Has micrometer type fine adjustment. It is the microscope generally selected for medical work. Mechanical stage on No. 33MH has a range sufficient to cover 3" x 2" microscope slide.



JUNIOR STEREOSCOPIC MICROSCOPE No. 67

This instrument meets the demand for a low cost stereoscopic microscope for general classroom use. The vivid erected image aids inspection and analysis of the object. The paired objectives are of the same optical quality as those used on higher priced instruments and may be furnished in a special, dustproof revolving nosepiece. Supplied at slightly higher cost with base, mirror and inclination joint.



STANDARD STEREOSCOPIC MICROSCOPE No. 25

Notable improvements, the result of long cooperative experience with users of this type of equipment, distinguish the present Spencer Stereoscopic Microscope. Satisfactory stereoscopic vision depends upon depth of focus as well as angle and Spencer scientists have found a practical balance that provides depth as well as brilliant resolution. A large object field and resolution of fine detail are equally important features. A wide range of magnification, from 6.3X to 144X, is available.

FOR SPENCER STILL PROJECTOR EQUIPMENT SEE PAGE 276

THERE IS A SPENCER MICROSCOPE FOR EVERY PURPOSE. WRITE DEPT. B13 FOR COMPLETE DETAILS

GENERAL ELECTRIC COMPANY

General Office: Schenectady, New York

SALES OFFICES IN PRINCIPAL CITIES

ELECTRICAL LABORATORY APPARATUS AND EDUCATIONAL SERVICE

for

COLLEGES AND TECHNICAL SCHOOLS

Motors	**Switchboards**	**Control Panels**	**Transformers**
Generators	**Converters**	**Relay Demonstration Panels**	**Electric Measuring Instruments**

Special attention has been given by General Electric to the design and manufacture of various instruments, machines, and devices for use in school laboratories. This equipment embodies the characteristics of the corresponding commercial types, but is smaller in size and rating, and is less expensive.

General Electric engineers will be glad to recommend apparatus to meet your special conditions if you will supply such details as the type of course, number of students, laboratory or shop space available, etc.

Publications, technical information, motion-picture films, illustrated lectures, etc., are available without charge. Further than this, liberal discounts are allowed to educational institutions.

ELECTRIC MEASURING INSTRUMENTS

A well-equipped college laboratory will need an assortment of standard electric measuring instruments of all types and capacities, since there is hardly an experiment performed by the students which does not require their use.

The satisfaction and benefit derived from these laboratory experiments depend to a very large degree upon the accuracy of the instruments. There is nothing more discouraging to the student than to find that his results do not check. When selecting laboratory instruments, consideration should be given to accuracy, permanence of calibration, deadbeat indications, and legibility of scales. Of course, local disturbances should not influence readings and, in many cases, low internal losses are important. If, added to these features, instruments of structural simplicity and fine appearance can be obtained, one important problem facing the laboratory director will have been solved.

In the design and construction of G-E electric measuring instruments, careful consideration is given to all these details. The instruments described on the following pages have been selected from a wide range of the Company's products as being most suited to school-laboratory use.

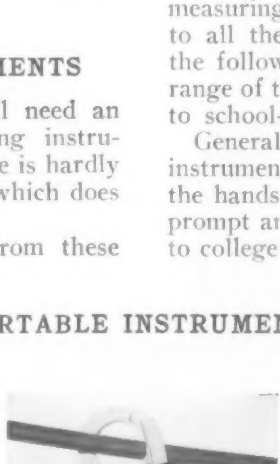
General Electric, aware that electrical laboratory instruments are subjected to extremely rough usage in the hands of inexperienced students, offers at cost, a prompt and complete repair and recalibration service to college and technical schools.

PORTABLE INSTRUMENTS

TYPE AK-1 HOOK-ON VOLT-AMMETER

A versatile, portable instrument for measuring alternating current and voltage, quickly and accurately (within 3 per cent). It's safe, simple, and easy to use. Alternating current can be read on both insulated and noninsulated conductors (up to 2 inches in diameter) by simply hooking the instrument around the line—no cutting of conductors, no additional equipment. It also measures a-c voltage by connecting the voltage leads supplied with the instrument.

Extension poles, in 4- and 6-foot lengths, are available for use on high-voltage circuits.



Hook-on volt-ammeter, Type AK-1

OTHER PORTABLE TYPES

In addition to the AK-1, General Electric makes a complete line of portable instruments, for a-c and d-c service, in a wide range of ratings:

Type P-3—A high-precision instrument, designed for long, dependable service. Accuracy, 0.2 of 1 per cent. Scale length, 6½ inches.

Type AP-9—A medium-sized instrument for general laboratory and testing work. Accuracy, ¾ of 1 per cent. Scale length, 4.1 inches.

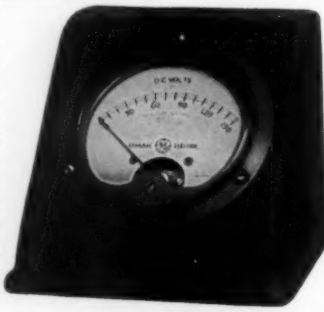
Type AS-5—An instrument that fits in a coat pocket. Accuracy, 1 per cent. Scale length, 2.7 inches.

For complete information, ask for Catalog GEA-602.

SMALL PANEL INSTRUMENTS

Alternating and Direct Current

This line of instruments includes voltmeters, ammeters, milliammeters, and microammeters Types AO and DO). Accuracy is within 2 per cent of full-scale value. Cases are of durable molded Textolite. Applications include welding sets, battery-charging panels, radio test sets, etc. Types AO-21 and DO-40 are supplied with a universal type case, for flush or surface mounting. Types AO-22 and DO-41 have a wide flange for flush mounting; diameter over flange, 3½ inches. Ask for GEA-1239.



Portable stand for 3½-inch instruments

INKLESS STRIP-CHART RECORDERS

For Alternating and Direct Current

Inkless recorder, Type CF-1

These recorders are ideal for voltage and load surveys, as well as for maintenance and testing. There's no ink to spill, no pen to clog, and they'll operate in temperatures from —10 F to 120 F. Ammeters, voltmeters, millivoltmeters, milliammeters, and microammeters are available in chart speeds of 1, 2, or 3 inches per hour, or 1 inch per day. Ask for GEA-3187.

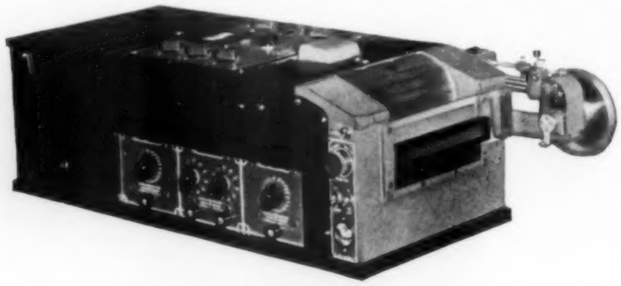
A complete line of ink recorders for switchboard use are also available. Ask for GEA-1061.

Switchboard Instruments—A complete line is available in various styles and ratings.

PERMANENT-MAGNET OSCILLOGRAPHS

The new six-element, general-purpose oscillograph, Type PM-10, is designed for both laboratory and field work, and it is provided with simultaneous viewing. Six galvanometers are furnished for current or potential measurements, and double-galvanometer units are available so that as many as twelve elements can be used. Also, watt galvanometers are available for recording single-phase or three-phase power.

This oscillograph produces records 3⅝ in. or 6 in. wide, either in a magazine film holder giving 3 or 5 exposures on a roll film, or in continuous-drive film holder giving continuous records up to 20 feet in length. A continuous-drive record-paper holder is available, which gives records up to 100 feet in length.



Six-element oscillograph, Type PM-10

The portable two-element oscillograph, Type PM-12, is entirely self-contained. This instrument meets the needs of schools and colleges where it is desired to show two simultaneous records (current and voltage) on a viewing screen. A rheostat is available which can be connected in series with the current element, thus providing for two voltage records. It also provides means of making inexpensive oscillograms of recurrent phenomena. A magazine film holder is included with this instrument. A continuous-drive film holder for use in recording transient phenomena can also be furnished.

Two-element, portable oscillograph, Type PM-12

ELECTRON TUBES

About two years ago we introduced to the colleges a new laboratory diode—the FP-400 kenotron. Shortly after, we featured the group of three triodes—PJ-7, PJ-8, and GL-418. These tubes have made a place for themselves in the electronics laboratory, as is shown by the steadily increasing sales to schools and colleges.

THE DIODE

The PF-400 kenotron has a pure-tungsten filament located axially in a cylindrical carbonized-nickel anode. This makes it especially well adapted for studying and demonstrating the important fundamental laws of the high-vacuum tube. Among these studies may be listed: (a) limitation of current by space charge, (b) relation between temperature and electron, and (c) the effect of a magnetic field on electron flow between cathode and anode.

Information on the essential dimensions of the electrode structure is supplied with this tube. This will enable the student to compare experimental results with calculated data.

The diode

The triode

THE TRIODE

Familiarity with the triode is important, not only for itself, but also because it forms the basis of the more complicated multigrid tube. A systematic study is made possible with this set of three triode tubes. They are identical except for the pitch of the grid winding.

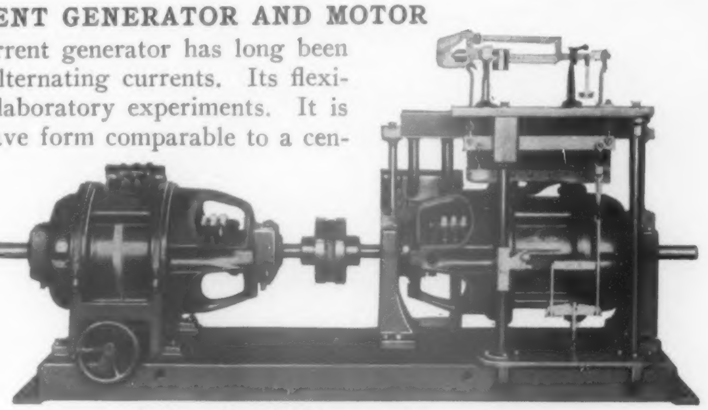
Many valuable laboratory experiments will readily suggest themselves to the instructor. These include determination of triode characteristics, the triode constant, the grid-current characteristics, and the effect of amplification factor in a voltage amplifier.

Further details regarding these tubes, including characteristics, dimensions, suggested experiments, etc., as well as special educational prices, will be sent on request. Address the nearest office of the General Electric Company.

ALTERNATING-CURRENT GENERATOR AND MOTOR

The Type AHI 6-pole 5-kva alternating-current generator has long been the standard for teaching the fundamentals of alternating currents. Its flexibility permits its use in a very wide variety of laboratory experiments. It is now manufactured with skewed poles giving a wave form comparable to a central-station wave, or with straight poles which shows excellently the effect of tooth ripple on the wave form.

The Type AHI is designed to run as an alternator or synchronous motor. Extra rotors are available which, when substituted in place of the salient-pole rotor, convert the machine into a squirrel-cage induction motor, a phase-wound-rotor induction motor, or a frequency converter.

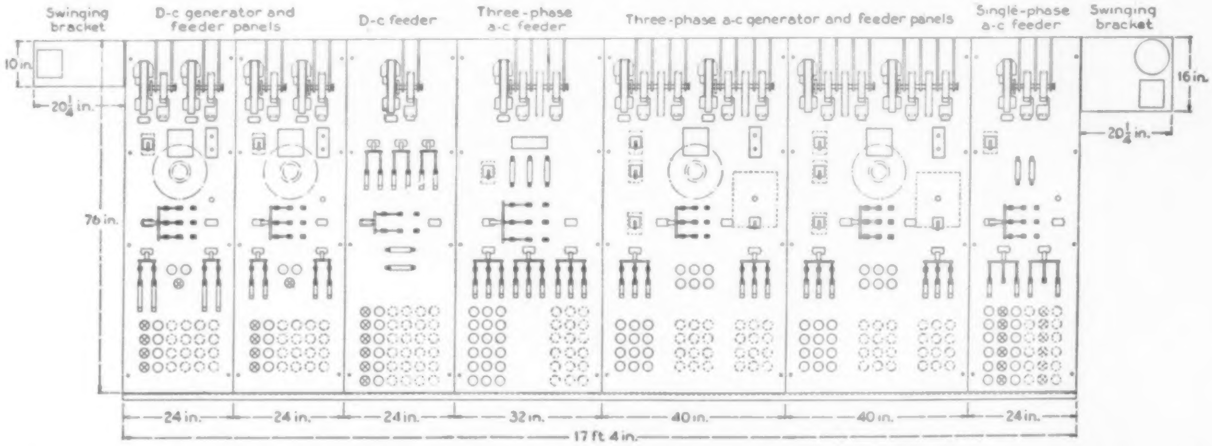


5-kva phase-displacement dynamometer set

A phase-displacement set and a phase-displacement dynamometer set, illustrated, have been developed around the most commonly used 5 kva rating. These two-unit sets are designed for maximum flexibility in the laboratory.

LABORATORY SWITCHBOARD

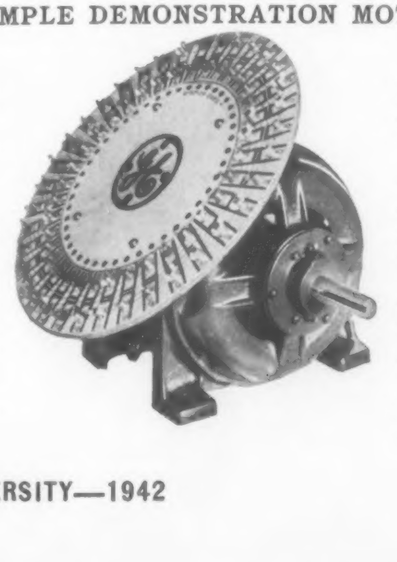
General Electric has developed a switchboard which provides maximum flexibility to meet the needs of the technical-school laboratory. This board provides for parallel operation of a-c and d-c generators, under standard conditions, and it supplies the laboratory with a very effective and variable feeder system. A specially designed plug switch is used extensively throughout the board. It facilitates making and changing connections, and saves time and trouble in shifting power to circuits where needed.



The holes shown dotted are for CR1939 receptacles to be purchased separately, mounted by the purchaser, and connected to the auxiliary plug-switch panels. Holes not placed in service may be buttoned

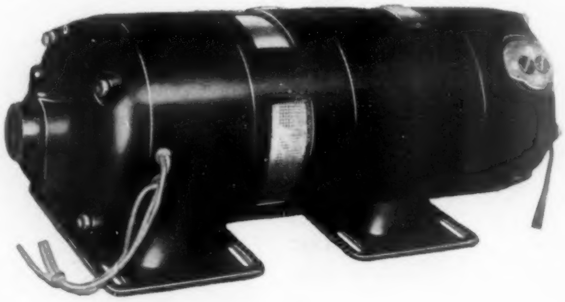
A SIMPLE DEMONSTRATION MOTOR

The squirrel-cage induction motor is probably the commonest electric apparatus in the industrial field for the purpose of transmitting torque. Its use is universal. The accompanying illustration shows a recently developed induction motor (special Type K-225, 2-hp, 2/3-phase) designed to show how the electric and magnetic circuits are set up, and to demonstrate, in a practical manner, the common connections of lapped windings, illustrating phase grouping, coil spacing, and coil connections.



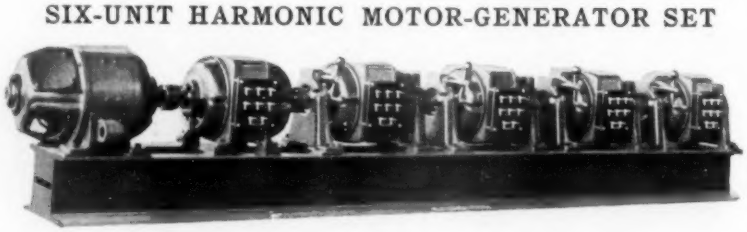
The motor can be connected for 4-, 6-, or 8-pole operation, from either a 2- or 3-phase source. It has 36 stator slots and 45 rotor slots. The 36 stator coils have all 72 leads brought out to a circular Textolite terminal board mounted on the frame. This board is so marked that the location of all coil ends and stator slots can be clearly checked with their respective terminals. Not only is every coil shown schematically, but every rotor bar is also shown.

DYNAMOELECTRIC AMPLIFIER



Though developed only a relatively short time, the amplidyne generator is already productively engaged in various fields of industry. For example, it divides the load between large d-c motors operating in parallel; it controls reel tension in wire-drawing machines; it maintains close speed regulation of tandem cold-strip mills. Since this machine will be important to future engineers, professors will undoubtedly wish to investigate its educational possibilities.

SIX-UNIT HARMONIC MOTOR-GENERATOR SET



Some of the applications for which this set can be used are: meter calibration, iron testing, high-voltage measurements, wave analysis, phase-displacement problems, and telephone-interference studies. The second-harmonic generator has been included for reproducing certain unsymmetrical wave shapes.

The harmonic motor-generator set consists of:

(a) A 10-hp. 230- or 115-volt d-c, shunt-wound, 40 C, continuous, ball-bearing, 3600-rpm motor capable of 10% speed variation above and below normal speed;

(b) A fundamental, or 60-cycle, generator rated 5 kva, 0.95 p f, 220 volts, 3-phase, 60 cycles, 3600 rpm, 50 C, continuous, ball bearing;

(c) A second-harmonic generator rated 2 kva 0.95 p f, 88 volts, 3-phase, 120 cycles, 3600 rpm, 50 C, continuous, ball bearing;

(d) A third-harmonic generator rated 2 kva, 0.95 p f, 88 volts, 3-phase, 180 cycles, 3600 rpm, 50 C, continuous, ball bearing;

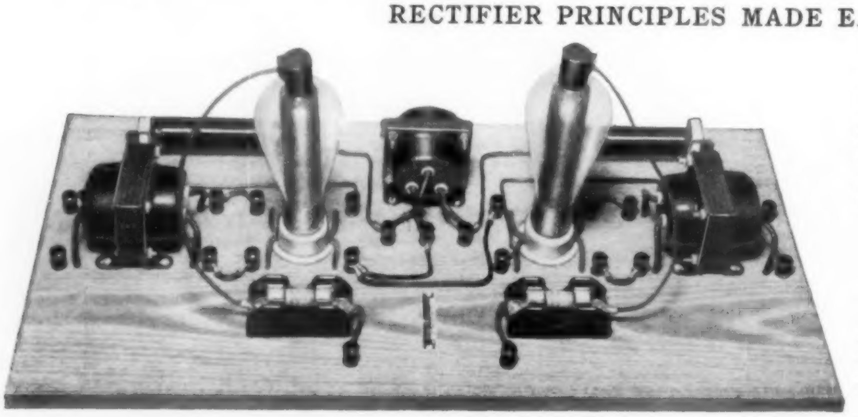
(e) A fifth-harmonic generator, rated 1 kva, 0.95 p f, 44 volts, 3-phase, 300 cycles, 3600 rpm, 50 C, continuous, ball bearing;

(f) A seventh-harmonic generator rated 1 kva, 0.95 p f, 44 volts, 3-phase, 420 cycles, 3600 rpm, 50 C, continuous, ball bearing.

All generators are equipped with a terminal board with eight leads brought out—the two d-c field leads and the six phase and neutral leads. All generators, except the fundamental, are pedestal-mounted, and are equipped with worm-gear and handle assembly for rotating the stator of each machine through 360 electrical degrees. A scale calibrated in electrical degrees is attached to each moving mechanism, with a pointer to indicate the phase displacement from the neutral or zero position. The generators are so designed that, with the pointers of all machines on the zero marking, the zero of fundamental voltage wave will coincide with a zero on the voltage wave of each harmonic generator. Thus, by releasing a locking screw and turning the moving-mechanism handle, the phase position of each harmonic generator may be easily shifted with respect to the fundamental generator.

The harmonic generators can be furnished as a complete set, with fundamental, 2nd, 3rd, 5th, and 7th harmonic generators; or as individual units, so designed that they may be coupled to each other.

RECTIFIER PRINCIPLES MADE EASY



Rectifier panels are designed to permit the use of different types of vacuum tubes, thereby demonstrating either simple rectifier action or grid-control action. When such a unit is used with additional panels of similar construction, the characteristics of a polyphase unit can be clearly and easily illustrated.

In addition, there is available an auxiliary panel for use with the single-phase rectifier which will illustrate time-delay cathode protection and phase-shift control. Similarly, for the 3-phase rectifier, another type of auxiliary panel is obtainable which will demonstrate time-delay cathode protection.

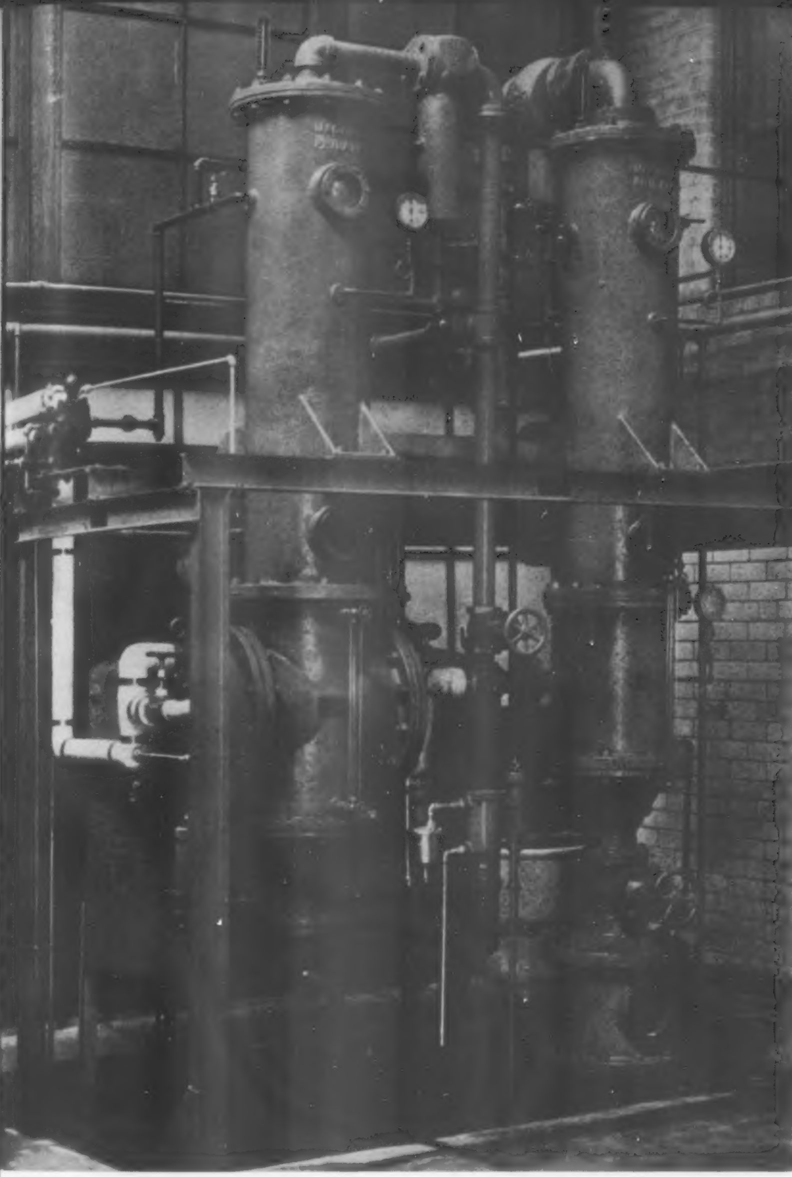
Bulletins Available on Request

Bulletin GEA-1185, illustrating and describing G-E apparatus particularly adapted to school and college laboratory use, is available on request. Also booklets on construction projects as follows:

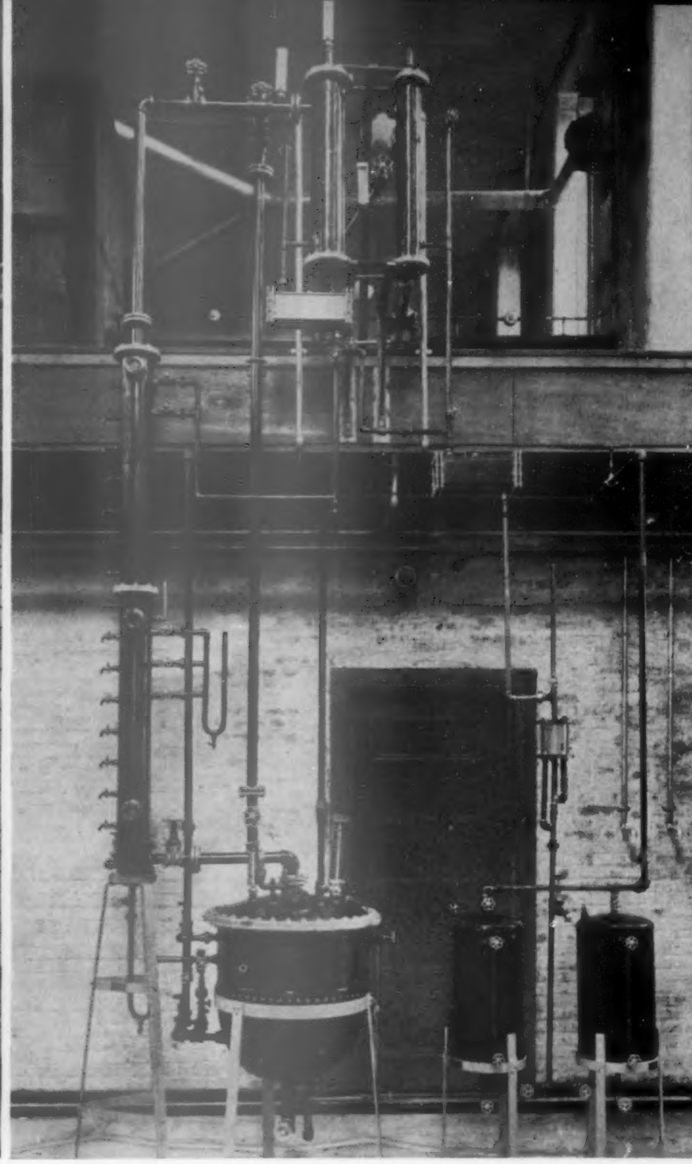
Construction Data, ¼-hp Single-phase Induction Motor, GEA-3514.
Construction Data, ½-hp Three-phase Induction Motor, GEA-3542.
Construction Data, ½-hp Single-phase Induction Motor, GEA-3526.
Construction Data, 250-watt Compound-wound D-c Generator, GEA-2289.
Construction Data, Transformer Rated Natural-draft, 60 cycles, 1½ kva; Primary Volts, 220; Secondary Volts, 55/110, GET-569.

Kits for these can be purchased from the General Electric Company.

Complete information can be obtained from the nearest G-E office.



Double Effect Evaporator. Either effect can be used separately. Gauges, thermometers, testers and measuring tanks permit collection of comprehensive inquiry data on a variety of operations. Several other standard models are available



Fractionating Column. Can be operated at atmospheric pressure or under vacuum. Double receiver permits separation of fractions distilled over. By-pass line used for open steam distillations. Numerous thermometers, sampling cocks and rotometers permit collection of comprehensive inquiry data on a variety of operations

STOKES *Special* EQUIPMENT
for Teaching and Research

We have had the privilege of working with the directors of the Frick Laboratory at Princeton, the chemical engineering laboratories at the Universities of Columbia, Pennsylvania, Tulane, Florida, Penn State College, University of Shanghai and others, both here and abroad. We have engineered and manufactured equipment in great variety, for both laboratory and industrial purposes, for more than 40 years.

This broad experience enables our engineers to cooperate with you in a most practical way in designing and building the type of apparatus you require, apparatus so designed that data may be obtained for the demonstration of basic principles in teaching or research activities.

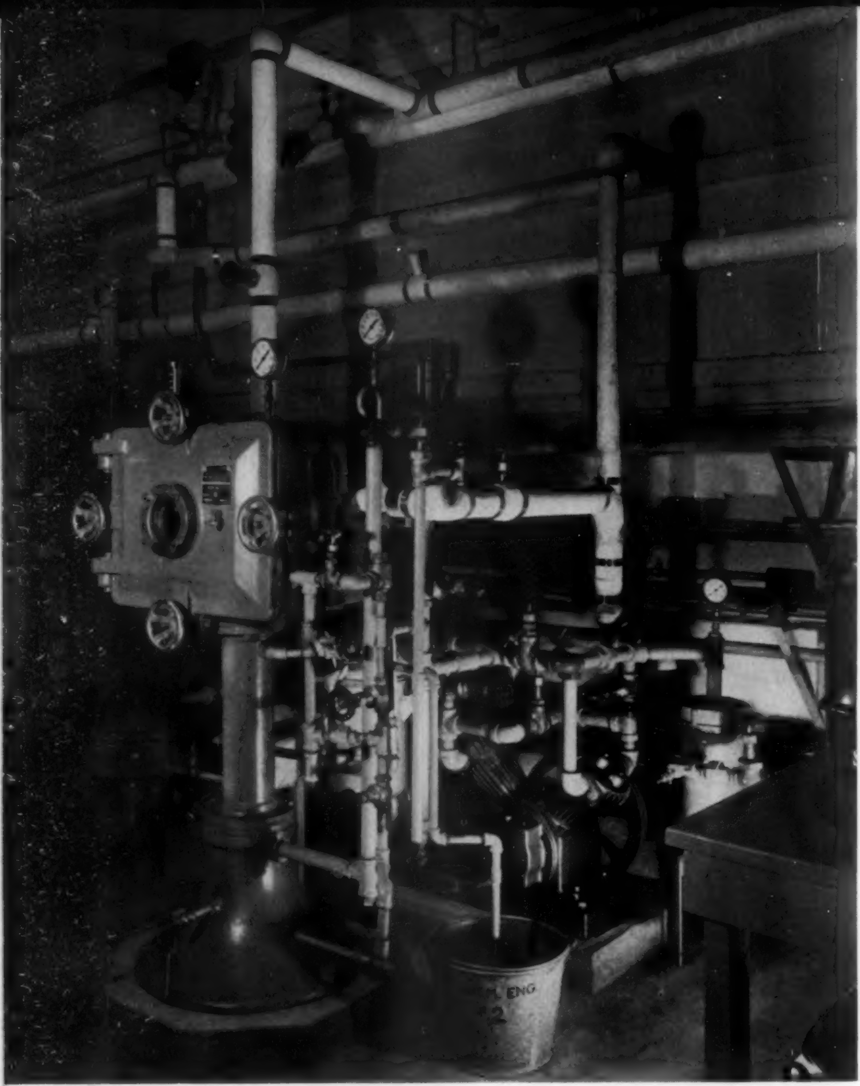
Consult with us about equipment needed to develop or expand your facilities . . . Dryers, Evaporators, Distilling or other special apparatus and for Water Stills, Vacuum Dryers, High Vacuum Pumps and Gauges, etc. We know how to build equipment *economically* to best meet special requirements . . . will be glad to make specific suggestions and recommendations, if you will state your problem.

F. J. STOKES MACHINE COMPANY

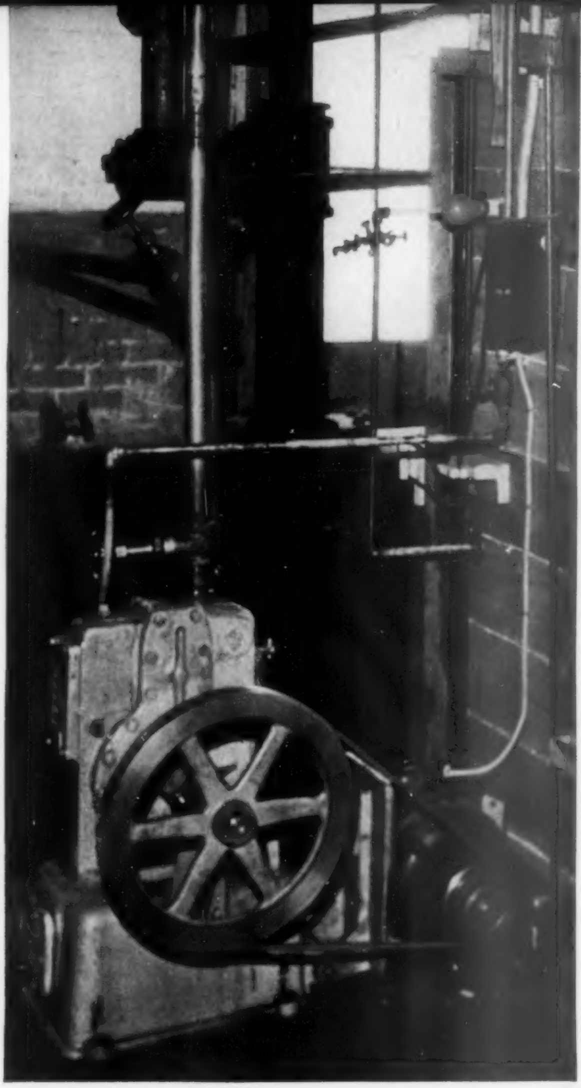
5960 Tabor Road Olney P. O. Philadelphia, Pa.

Representatives in New York, Chicago, Cincinnati, St. Louis, Cleveland, Detroit

Pacific Coast Representative: L. H. Butcher Company, Inc.



Vacuum Shelf Dryer at Cooper Union, N. Y. Used for running tests on all kinds of materials. Piped to circulate hot water or steam through shelves. Equipped with thermocouples to measure temperature, of materials. Vertical surface condenser is built into base. Two-cylinder vacuum pump arranged so that cylinders can be used separately on dryer and other apparatus or together as a two-stage unit for high vacuum. Installation includes small steam boiler and steam-water mixing chamber



Stokes High Vacuum Pump, 10 cu. ft. per min. capacity, installed at Cornell University. Similar pumps are used at Columbia University, Pratt Institute and other schools

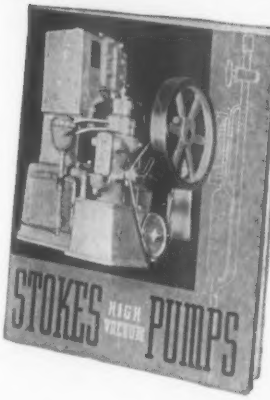
HIGHER VACUUM
—and its Widening Applications

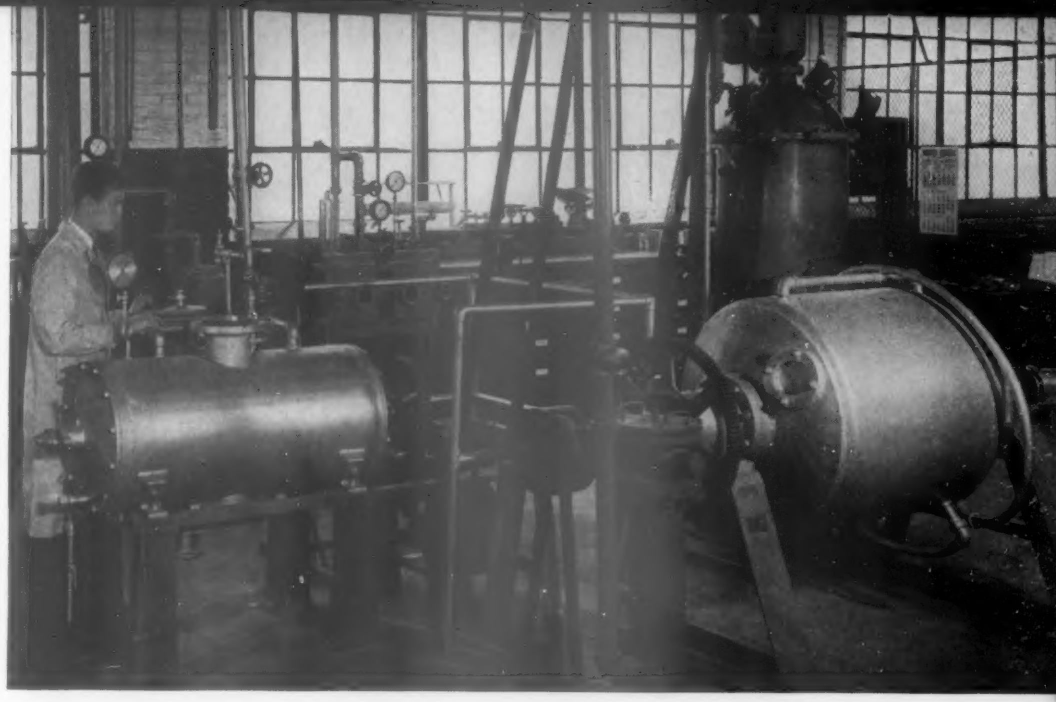
As you know, there is a growing trend toward the use of higher vacuum by Industry. It is being successfully applied to an ever-widening variety of operations . . . to process heat-sensitive materials at lower temperatures; reduce oxidation in chemicals and metals; speed up drying operations with lower steam or hot water temperatures; preserve vitamins in foods and potency in drugs and serums; minimize explosion hazards and control obnoxious fumes; obtain more complete evacuation prior to impregnating or fumigating.

These are only some of the things that are today being done better . . . and more economically . . . under higher vacuum. But improved methods call for specialized knowledge and training. To successfully demonstrate their applications and advantages requires laboratory equipment designed to duplicate actual full-scale manufacturing procedure.

We were pioneers in the field of higher vacuum . . . for more than 35 years have contributed, by way of research, engineering and the development of equipment, to the advancement of high vacuum methods. Typical Stokes Laboratory equipment, such as shown on these two pages, is simple, basic, practical apparatus. It is of the same type, design and construction as that we build for Industry . . . adapted to teaching, research or demonstrating actual manufacturing technique.

We should be pleased to consult with you. Catalogs on equipment in which you may be interested will be sent promptly.





HIGH VACUUM PUMPS

Research at higher vacuum, within a few microns of absolute, can be undertaken with assurance in laboratories equipped with Stokes High Vacuum Pumps. These laboratory size pumps are identical in design with the larger Stokes pumps used by Industry . . . rugged, simple, foolproof, with high mechanical and volumetric efficiencies.

There are only three internal moving parts in these pumps. They have no dead space, or clearance; discharge of air at the end of each stroke is complete.

A built-in Oil Clarifier continuously removes moisture from the oil; even sudden slugs of liquid are discharged without loss of vacuum. A Solvent Stripper can be furnished to remove and reclaim solvents. Many other exclusive features.

Write for pump catalog No. 38-P and combined Handbook on Vacuum Practice . . . contains tables, graphs and original information, some never before published. A valuable book for study and reference.

A FEW USERS OF STOKES EQUIPMENT

Columbia University ★ University of Detroit ★ Phila. College of Pharmacy and Science ★ Oregon State College ★ Kansas State College ★ Tulane University of Louisiana ★ University of Pennsylvania ★ West Virginia University ★ Princeton University ★ University of Florida ★ Pennsylvania State College ★ Clarkson College ★ Chiao Tung University (Shanghai) ★ National University of Chekiang (Hangchow) ★ Cooper Union ★ Pratt Institute ★ Lafayette College.

STOKES CATALOGS

High Vacuum Pumps. See mention above. Ask for Catalog 38-P.

Processing Equipment. Describes laboratory and industrial equipment, atmospheric and vacuum types. Catalog 42-C.

Water Stills. Describes laboratory stills. Capacities up to 100 g.p.h. Electric, gas, steam-heated models. Catalog No. 41-S.

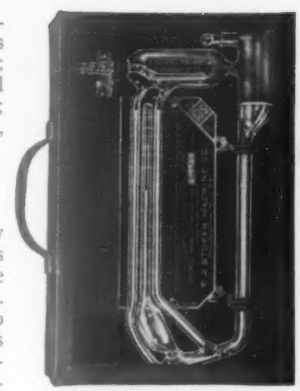
Pharmaceutical Equipment. Includes laboratory equipment and Tablet Machines. Catalog 42-T.

High Vacuum Gauges. See description above. Bulletin 902.

Tablet Compressing Machines. Catalog No. 41-T.

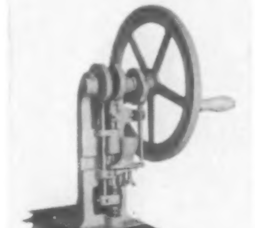
LABORATORY VACUUM EQUIPMENT

Above installation includes several types of equipment designed for high vacuum research purposes and semi-plant scale operations . . . Rotary Dryer; Rotating Dryer for crystals, metallic powders and other materials that can be tumbled; Pan Dryers; Shelf Dryers; High Vacuum Pump and Condenser, etc.



HIGH VACUUM GAUGES

New, portable, McLeod type gauges. Particularly suited for making quick readings (in 2 to 5 seconds only) within the micron range at any point in the laboratory. These are simple, rugged instruments. Mercury can't spill. Practically unbreakable. Two models, 0 to 5000 microns and 0 to 700 microns (finest graduation 1/10 microns). Bulletin 902.

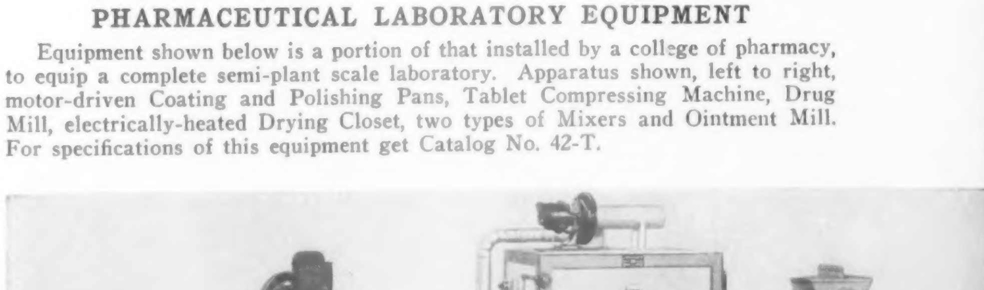


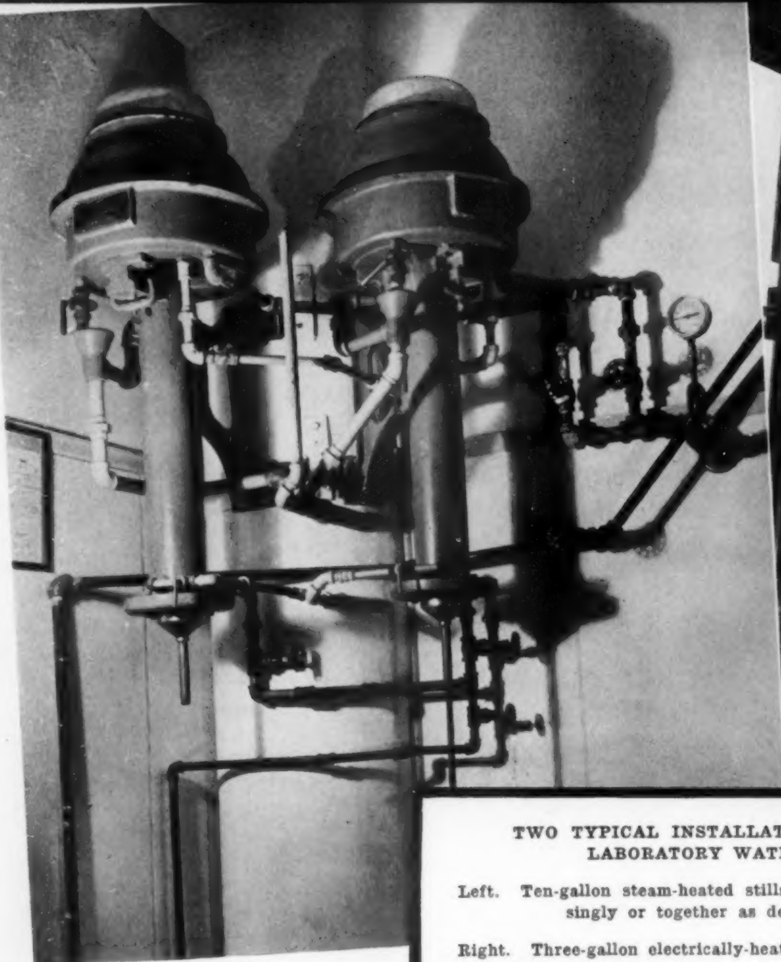
TABLET MACHINES FOR CHEMICAL AND METALLURGICAL RESEARCH

This popular laboratory model "Eureka" Tablet Machine is widely used for research purposes, compresssing chemicals, making experimental batches of catalytic tablets (that pack uniformly and expose large reaction surfaces) tableting pharmaceuticals, etc. It makes tablets up to ½" dia., at rates of 50 to 100 per min. More than 2000 in use. Hand-operated or motor-driven models. This machine is one of more than 20 stock models. Write for Catalog 41-T.

PHARMACEUTICAL LABORATORY EQUIPMENT

Equipment shown below is a portion of that installed by a college of pharmacy, to equip a complete semi-plant scale laboratory. Apparatus shown, left to right, motor-driven Coating and Polishing Pans, Tablet Compressing Machine, Drug Mill, electrically-heated Drying Closet, two types of Mixers and Ointment Mill. For specifications of this equipment get Catalog No. 42-T.





TWO TYPICAL INSTALLATIONS OF STOKES LABORATORY WATER STILLS

Left. Ten-gallon steam-heated stills arranged to be operated singly or together as demand requires

Right. Three-gallon electrically-heated still with storage tank and full automatic controls to start still when tank is half empty and to stop and flush out the still when the tank is filled

PURE WATER... A Laboratory Necessity

With a Stokes Water Still you can produce, dependably and economically, the chemically and bacteriologically pure distilled water required for all laboratory purposes . . . water of exceptional purity, well above strict U.S.P. requirements. (See typical analysis below.)

These stills are automatic in operation, simple, rugged and easy to clean. They operate on an efficient counter-current principle, the heat of the steam generated in the boiling chamber being utilized to preheat the raw feed water on its way to the boiling chamber. This method is very effective in making maximum use of the heat supplied to the still, thus reducing cost of operation to about ¼ cent per gallon for steam-heated models, 2 cents per gallon for gas and 4 cents (varying with the cost of current) when electrically-heated models are used.

Design and construction of these stills protect the purity of distillate by removing dissolved gases from the feed water, eliminating entrainment and continuously removing impurities that tend to accumulate in the boiling chambers. Stills can be equipped with complete automatic controls and are available either with or without storage tanks.

More than 18,000 Stokes Stills are in use the world over. Laboratory models are available through your own laboratory supply dealer. For sizes, specifications, etc., send for Catalog No. 41-S.

Electrically-heated laboratory still, ½ to 1½ g.p.h. capacity. These stills have an improved type heavy-duty heating element, fully protected against burn-out by a patented dual-purpose safety switch that cuts off the current, instantly, in case of over-heating from any cause.

***TYPICAL ANALYSIS OF DISTILLATE**

	Parts per 100,000
Total Solids as	
Volatile Solids	0.16
Inorganic Solids	0.12
Nitrogen as	
Free Ammonia	0.0035
Albuminoid Ammonia	0.0000
Nitrates	0.0000
Nitrites	0.0000
Chlorine	0.00
Bacteria per cc.	none

* Certified.

F. J. STOKES MACHINE COMPANY

5960 Tabor Road Olney P. O. Philadelphia, Pa.

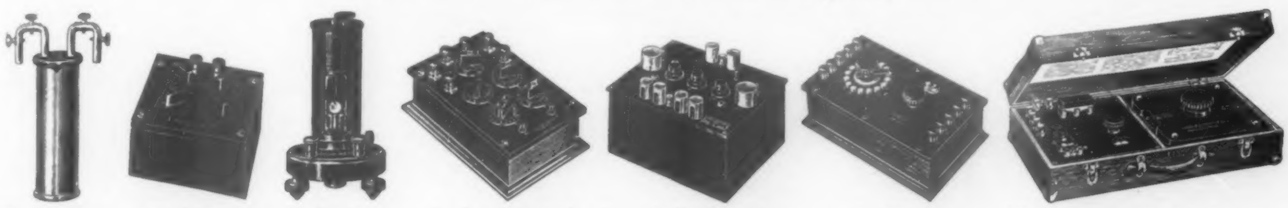
Representatives in New York, Chicago, Cincinnati, St. Louis, Cleveland, Detroit

Pacific Coast Representative: L. H. Butcher Company, Inc.

LEEDS & NORTHRUP COMPANY

Measuring Instruments — Automatic Controls — Heat-Treating Methods

Logan & Stenton Avenue, Philadelphia, Pa.



N.B.S. Type Resistor | 4-Dial Resistance Box | Reflecting Galvanometer | Inclosed-Switch Wheatstone Bridge | Campbell-Shackelton Shielded Ratio Box | Students' Potentiometer | Silsbee Current Transformer Test Set

INSTRUMENTS FOR RESEARCH, TEACHING AND TESTING

As a guide to the choice of instruments, all of which apply sound principles in reliable constructions, for specific work in laboratory, plant or field, we supplement our more detailed literature (indexed below) with a comprehensive catalog, listing the entire L&N line for research, teaching and testing. This condensed catalog serves as an illustrated price list and index, with brief descriptions. Ask for:

Electrical Measuring Instruments
For Research, Teaching and Testing ....Catalog E

Standards. For use as reference or working standards in d-c and a-c bridge measurements, and in potentiometer measurements, we offer a wide choice of fixed and adjustable standards . . . d-c and a-c resistors, attenuators, inductors, mica and air capacitors, and standard (potential) cells. For complete listings, see Catalog E. Details about resistors in:

Resistance and Conductance Measurements...........Catalog E-53

Galvanometers and Dynamometers. For use as balance-point detectors in potentiometer or bridge measurements, and for calibrated deflection measurements, there are: d-c and a-c moving-coil galvanometers in a variety of reflecting and pointer types; Coblentz moving-magnet galvanometer, primarily for use with thermopiles in measuring radiant energy; astatic dynamometers, having unusually high sensitivity to power. Write for:

Galvanometers and Dynamometers....................Catalog ED

D-C Bridges. For measuring d-c resistance, we offer Wheatstone bridges, and for very low resistances, Kelvin double bridges. There is a choice of models for general resistance measurements, for resistance-thermometer temperatures, for locating faults in communication and power circuits, and for other tests. In addition, there are ratio boxes and slidewires. Further information about d-c bridges in:

Resistance and Conductance Measurements...........Catalog E-53
Type U Test Set...........................Catalog E-53-441(1)
Type S Test Set...................................Bulletin 530
Morse-Newhall Test Assembly................Folder E-53-441(1)
Power Cable Fault Bridge..................Catalog E-53-441(4)
Students' Kelvin Bridge...........................Bulletin 434
Kelvin Bridge Ohmmeter.......................Catalog EF-22C
Mueller Bridges.............................Catalog E-33C(1)
Body and Skin Temperature Measurements........Catalog E-33-423

A-C Bridges. To measure inductance, capacitance, resistance and related a-c quantities, at commercial, audio and higher frequencies, we build a varied line of a-c bridges. See Catalog E; also:

Frequency Recorders and Indicators..............Catalog N-57-161
Electrolytic Conductivity Measurements............Catalog EN-95
Sugar Ash Bridge..........................Catalog E-95-460(1)

Potentiometers. There is a choice of L&N potentiometers adapted to a variety of emf measurements; and of others specialized to measure emf as a function of temperature, pH or other specific quantity. Described in Catalog E, and in:

Type K Potentiometers.......................Catalog E-50B(3)
Students' Potentiometer.....................Catalog E-50B(1)
Brooks Deflection Potentiometers............Catalog E-50B(2)
Wenner Thermocouple Potentiometer...........Catalog E-33A(1)
White Potentiometers........................Catalog E-33A(2)
Body and Skin Temperature Measurements........Catalog E-33-423
Apparatus for Checking Thermocouple Pyrometers.Catalog E-33A-503
Hydrogen-Ion Concentration (pH) Measurements.....Catalog EN-96
Portable Universal pH Indicator.................Catalog E-96(1)
Portable Glass-Electrode pH Indicator ....Catalog E-96(2)
Thermionic Amplifier...........................Catalog E-00 A

Jrl Ad ENT-0441(1)

Photometers. Bar photometer, generally used for measurements of highest precision; visual and photoelectric sphere photometers, with which spherical candlepower of a lamp can be determined in a single measurement; distribution photometer, for determining polar light flux distribution around large lamps and luminaires; Macbeth Illuminometer, compact, portable, for measuring illumination . . . described in:

Photometers ....Catalog E-72

Miscellaneous Apparatus. Specialized measuring equipments facilitate certain routine tests: characteristics of magnetic materials; ratio and phase-angle of instrument transformers; specific inductive capacity and power factor of solid and liquid dielectric materials; insulation resistance; chemical analysis, using the dropping-mercury cathode method; and other tests. Described in Catalog E; further details in:

Potential Transformer Test Set.......................Bulletin 716
Silsbee Current Transformer Test Set.........Bulletin E-50-501(1)
Insulation Resistance Test Set..................Catalog E-54(1)
Modified Schering Bridge for Specific Inductive
Capacity and Power Factor ....Catalog E-54(2)
Power Factor by Phase-Defect Compensation
Method ....Catalog E-54(3)
Bushing Test Set ....Catalog E-54(4)
Knorr-Albers Microphotometer ....Catalog E-90(1)
Electro Chemograph (Recording Equipment for Dropping Mercury Electrode Applications) . Technical Publication E-94(1)
Polarized Dropping Mercury Electrode........Bibliography E-94(1)

Primary Elements, Accessories, Supplies. Thermocouples, resistance thermometers, pH electrodes, conductivity cells, accessories, supplies are listed in Catalog E. See also:

Thermocouples ....Catalog N-33A(6)
Keys and Switches..................................Catalog EU2
Operating Supplies for L&N Equipments...........Catalog ENT-W

INDUSTRIAL-TYPE INSTRUMENTS AND FURNACES OFTEN USED IN LABORATORIES

Industrial-type instruments and furnaces have many laboratory uses. Micromax recorders reading directly in temperature, pH or other units furnish continuous chart records of test runs. Sometimes, recorders which control automatically, and non-recording controllers are used. Industrial-type indicators, portable models especially, are often used for a variety of measurements; optical pyrometers, for high temperatures. In metallurgical laboratories, Hump and Homo methods for hardening, carburizing, nitriding, tempering and annealing are applied through small electric heat-treating furnaces. Publications on request. Please be specific.

POWER-PLANT INSTRUMENTS

Instruments for the power plant are described in:

Combustion Control for Boiler Furnaces..........Catalog N-01-163
Speed Recorders ....Catalog N-27
Flowmeter (Centrimax) For Steam and Water ....Catalog N-28-160
Temperature Instruments for the Steam Plant.....Catalog N-33-163
Temperature Control for Superheated Steam...Catalog N-33-163(1)
Temperature Instruments for Elec. Power Equip...Catalog N-33-161
Frequency Recorders and Indicators..............Catalog N-57-161
Frequency Controller, Industrial Type.........Catalog N-56-161(1)
Load-Frequency Control for Interconnected
Power Systems ....Technical Publication N-56-161(1)
Load Telemetering and Totalizing Recorders.......Catalog N-58-161
CO_2 Recording Equipment for Flue-Gas Analysis....Catalog N-91-163
Smoke Density Recorders ....Catalog N-93-163
Condensate-Purity Instruments for Steam Plant....Catalog N-95-163
Signalling Controller for Condensate Purity....Catalog N-95-163(1)
Corrective Water Treatment.................Bulletin N-96S-744A

WESTON ELECTRICAL INSTRUMENT CORP.

601 Frelinghuysen Avenue, Newark, N. J.

ENGINEERING AND SALES OFFICES

Albany	Chicago	Denver	Kansas City, Mo.	Minneapolis	Philadelphia	St. Louis
Atlanta	Cincinnati	Detroit	Knoxville	Newark	Pittsburgh	Seattle
Boston	Cleveland	Honolulu, T. H.	Los Angeles	New Orleans	Rochester	Syracuse
Buffalo	Dallas	Jacksonville	Meriden, Conn.	New York	San Francisco	

WESTON INSTRUMENTS
Standard for Instruction, Research, Industry

The use of WESTON instruments in educational work and scientific laboratories has become a fixed principle, for nothing short of WESTON accuracy and dependability are acceptable for engineering training. WESTON instruments are made to most exacting standards of craftsmanship and accuracy. They inspire students to be exact in experiments. And in using WESTONS in training, the student is familiarizing himself with the instruments he will use throughout his engineering career, for student graduates since 1888 have "Westonized" the industrial world. . . . Following is a condensed listing of the WESTON instruments available; also are illustrated a few of the models widely used in educational work. Complete information on all models is available in booklet form, and will gladly be sent on request.

MODEL 622

Ultra-Sensitive Microammeters, Millivoltmeters

Double pivoted type instruments for measurement of minute currents. Ideal for laboratory work and circuits involving thermocouples, pyrometers, electron tubes, etc.

MODEL 525

Projection Instruments

Ideal for lecture and demonstration work. Scale can be projected to any desired size . . . seen from any room position. **Available in A-C and D-C scale** . . . also with standard scales for all needs.

MODEL 703

Direct-reading Illumination Meters

Available equipped with the stable, all-glass WESTON VISCOR filter which permits direct measurement of incandescent, mercury vapor, fluorescent and all other light sources, regardless of color composition.

PORTABLE AND PANEL INDICATING INSTRUMENTS
Ammeters, Voltmeters, Wattmeters, Galvanometers, Microammeters, Ohmmeters, Microfarad Meters

INSTRUMENT TRANSFORMERS
Portable and Switchboard—Potential and Current

RELAYS
Sensitive and Power Uses—Current and Voltage Types

ELECTRIC TACHOMETERS
A-C and D-C Types—Remote Indicating

LABORATORY STANDARDS
Voltmeters, Ammeters, Wattmeters

SPECIALIZED TESTING EQUIPMENT
Power Analyzer, Photoelectric Potentiometer, Battery Testing Instruments

SERVICE EQUIPMENT
Tube Checkers, Analyzers, Oscillators, Ohmmeters, Vacuum Tube Voltmeters

PHOTOELECTRIC CELLS AND CONTROL DEVICES
* Photronic Cells—Dry Disc Type

LIGHT MEASURING DEVICES
Illumination Meter, Foot Candle Meters, Sight Meter, Exposure Meters

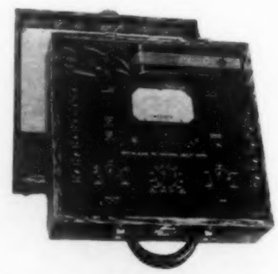
TEMPERATURE INDICATING INSTRUMENTS
Electrical Type—Remote Indicating
Bimetallic Dial Type—Laboratory, Industrial

STANDARD CELLS

** Photronic—A registered trademark designating the photoelectric cells and photoelectric devices manufactured exclusively by the Weston Electrical Instrument Corporation.*

Industrial Circuit Tester — MODEL 785

A truly versatile instrument for shop or laboratory, with the following broad ranges:



D-C VOLTAGE . . . 0-1/10/50/200/500/1000 volts—20,000 ohms per volt. (*5000 volt range with external multiplier.)

A-C VOLTAGE . . . 0-5/15/30/150/300/750 volts—1000 ohms per volt.

D-C CURRENT . . . 0-50 microamperes, 1/10/100 milliamperes, 1 ampere and 10 amperes (*ranges above 10 amperes with external shunts).

A-C CURRENT . . . self-contained ranges 0-.5/1/5/10 amperes (*higher ranges with an external current transformer).

RESISTANCE . . . 0-3000, 0-30,000, 0-300,000 ohms, 0-3 megohms, 0 to 30 megohms (self-contained batteries). 0-900 megohms (*with compact Model 792 Resistance Tester).

* Extra equipment on special order.

MODEL 375

Student Galvanometer

Widely used in school laboratories where durability and low cost rather than extreme sensitivity are requirements. Other models of medium and high sensitivity available.

MODEL 430

Portable, Precision A-C and D-C Instruments

Universally used in schools and industry wherever rugged, portable instruments are required for general testing. Hand calibrated, mirror scales with knife-edged pointers.

Built-up Test Equipment

Available as volt-ohmmeters, volt-ohm-milliammeters and other combinations. The line also includes radio tube checkers, vacuum tube voltmeters, high frequency oscillators, etc.

EDISON STORAGE BATTERY

DIVISION OF THOMAS A. EDISON, INCORPORATED

West Orange, New Jersey

SALES OFFICES IN THE FOLLOWING CITIES

Boston, Buffalo, Washington, Cleveland, Detroit, St. Louis, San Francisco, New York, Philadelphia, Pittsburgh, Cincinnati, Chicago, Seattle, Denver, Los Angeles

EDISON NICKEL-IRON-ALKALINE STORAGE BATTERIES FOR SCHOOL AND COLLEGE LABORATORY USE

EDISON Nickel-Iron-Alkaline Storage Batteries for school and college laboratories have two important advantages:

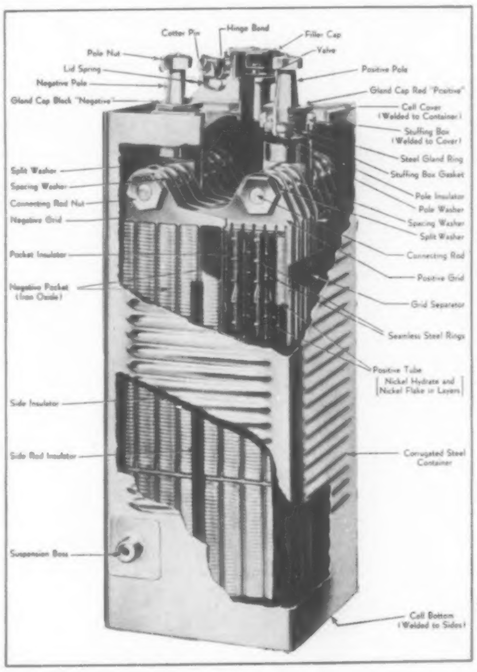
1. They are the most dependable and convenient source of d.c. for laboratory supply circuits.
2. They are extensively used in industry and hence a type with which the student is most likely to be concerned following graduation.

For D.C. Laboratory Supply Circuits

The Edison Nickel-Iron-Alkaline Storage Battery as a source of d.c. for laboratory supply circuits affords a dependability no other type of battery can approach. Use of steel for all structural parts combined with an alkaline electrolyte (which is a recognized preservative of steel) makes it practically indestructible and permits secure retention of all active materials within the plates.

Its charge and discharge results in the simple transfer of oxygen from one plate to the other. The fact that neither oxidation nor reduction, once completed, can be followed by further or other reactions, helps explain why it cannot be injured by overcharge, overdischarge, charge in reverse or other so-called electrical accidents.

These are some of the reasons for its great dependability, as well as its long life (2 to 5 times that of other batteries). Despite its higher first cost, it is the most economical battery to use.



Because of its all-steel cell construction the Edison Nickel-Iron-Alkaline Battery is the most durable made

A feature of especial value in school and college work is its ability to stand discharged during all vacation periods without need of attention and without suffering injury or deterioration of any kind.

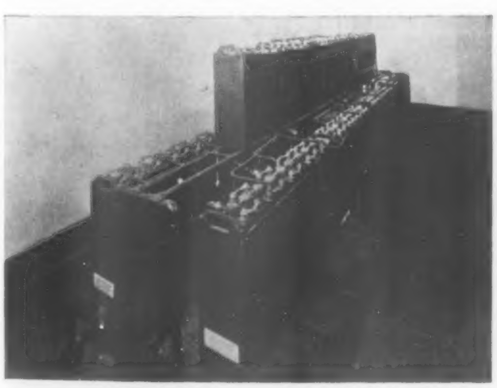
Another feature is the convenience of using any number of cells in a battery assembly to vary the voltage as desired. This may result in unequal discharge and subsequently in overcharge of some cells when the assembly as a whole is recharged. Unlike other batteries, however, the Edison Nickel - Iron - Alkaline Battery is not injured by such treatment.

As a Means of Training in Industrial Battery Applications

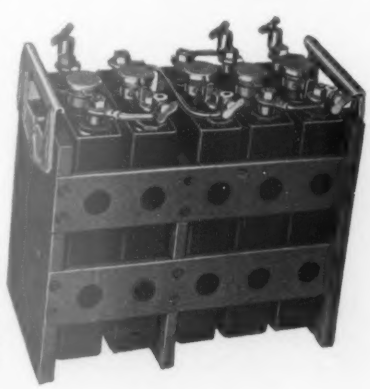
Practically every major industry in the United States uses battery industrial trucks for plant transportation and material handling.

Subways and other electrified railways use storage batteries for control purposes on locomotives and multiple unit cars. Mine locomotives, miner's electric cap lamps, ship's electric power stand-by, steam railway passenger car lighting and air conditioning are other important industrial storage battery applications. In all these services, Edison Nickel-Iron-Alkaline Storage Batteries are the type in most extensive use.

Instruction in their care, operation and construction is thus of very practical value to the student.



Typical stationary laboratory battery; consists of 100 A4H cells having a capacity of 150 ampere hours; through a switchboard the output of any number of cells is made available for experiments requiring variable direct current potentials



Typical portable laboratory battery; consists of 5 B2H cells having a capacity of 37.5 ampere hours; note special taps, supplied at no additional cost with this type of cell, which permit ready use of output of variable number of cells

THE ELECTRIC STORAGE BATTERY COMPANY

World's Largest Manufacturers of Storage Batteries for Every Purpose

Allegheny Avenue and Nineteenth Street, Philadelphia, Pa.

Atlanta, Ga., 210 Walker St., S. W.
Boston, Mass., 100 Ashford St.
Chicago, Ill., 4613 So. Western Blvd.
Cincinnati, Ohio, 718-19 Temple Bar Bldg.
Cleveland, Ohio, 6400 Hermann Ave., N. W.
Dallas, Texas, 1118 Jackson St.
Denver, Colo., 810 14th St.
Detroit, Mich., 8051 W. Chicago Blvd.
Kansas City, Mo., 129 Belmont Blvd.
Los Angeles, 1043 S. Grand Ave.
Minneapolis, Minn., 617 Washington Ave., N.
New Orleans, 428 Balter Bldg.
New York, N. Y., 23-31 W. 43rd St.
Philadelphia, Allegheny Ave. and 19th St.
Pittsburgh, Pa., Union Trust Bldg.
St. Louis, Mo., 1218 Olive St.
San Francisco, Cal., 6150 Third St.
Seattle, Wash., 1919 Smith Tower Bldg.
Washington, D. C., 1819 L St., N. W.

In Canada, Exide Batteries of Canada, Ltd., 153 Dufferin St., Toronto, Ont.

FOR
LABORATORIES
PROGRAM CLOCKS
FIRE ALARM
INTERIOR
TELEPHONES
AUTO-CALL

Exide
BATTERIES

FOR
AUTOMATIC AND
INSTANTANEOUS
EMERGENCY LIGHT
AND POWER
See Page 126

Exide Batteries, the product of The Electric Storage Battery Company, are extensively used in the laboratories of the nation's foremost scientists, industrial research engineers, schools and colleges. Their performance records are the best testimony that can be offered as to their merit for laboratory services. The foremost characteristics of Exide Batteries are absolute dependability and sustained high voltage until end of discharge.

Flexibility

The operation of an Exide Battery is flexible. Cell connections to the battery can be arranged so as to give any desired voltage, with a wide range in discharge rates available at that voltage. By assigning a group of cells of the battery to a definite experiment, a constant voltage is assured which is free from disturbance or interference by any outside influence.

An Exide Chloride Laboratory Battery Cell Cut-away to Show Unique and Sturdy Construction, Sealed Glass Jar Assembly

Improved Design Simplifies Maintenance

Exide Batteries of the sealed glass jar type have been carefully designed and are carefully constructed for laboratory service. A deep sediment space is provided at the bottom of each cell. Posts and connections are adequate for extremely high discharge rates and inter-cell connectors are of copper heavily coated with lead.

The structural details of Exide Batteries assembled in sealed glass jars have been so refined as to eliminate all maintenance attention other than recharging and an occasional addition of water, which, with automatic cell fillers, becomes a simple task.

Long Life

Exide Batteries are not only noted for their long life in laboratory service, but also in *all* types of industrial stationary service. *There are Exide-Chloride Batteries in laboratory and industrial installations which have been in constant use for 20 years and longer.*

For Any Budget

Regardless of how limited your budget appropriation, an Exide Battery can be selected to meet your requirements. They are available in a wide range of sizes and capacities, and can be installed so that cells may be added subsequently to obtain greater capacity.

Nation-wide Organization

We are prepared and equipped to help you with any laboratory battery problem which may present itself. The wide experience of Exide engineers and the services of our nation-wide Exide organization are at your disposal. Write to the nearest Exide office shown above for further information.

The Exide Chloride Battery in The Research Laboratory of Physics, Harvard University. It is Used for General Service Where Various Potentials from 2 Volts to 240 Volts Are Required

A Typical 12 Cell Exide Chloride Battery Widely Used in School and College Laboratory Work

SECTION XI
SHOP PLANNING AND EQUIPMENT

MAINTAINING SCHOOL-SHOP EQUIPMENT UNDER THE DEFENSE TRAINING PROGRAM

By F. THEODORE STRUCK

Head, Department of Industrial Education, The Pennsylvania State College

IN May, 1940, the U. S. Office of Education submitted to the Bureau of the Budget a report containing proposals for a nation-wide defense training program. The following month Congress appropriated $15,000,000 for summer defense training programs in schools and colleges. By July 1, a number of vocational schools, located from Golden Gate to Long Island Sound, were in operation. The national program of defense training was on its way in earnest. It has gained momentum week by week.

Ready Now!—One of the heart-warming experiences of the initial stages of the present vocational training program was the promptness with which the vocational schools of America swung into this defense training. Everywhere one could hear the hearty "We are ready now!" By January 1, 1941, 47 states, Hawaii and Puerto Rico were operating pre-employment and refresher classes in addition to the regular day program. Two and three shifts were being trained, and are being trained, in many vocational schools. Of course that calls for measures designed to keep machine tools and other equipment in tip-top condition.

Maintenance Under Heavy Use

Schools that formerly operated 6 hours per day are now in full swing for 12 or 20 hours out of 24. Some foresaw what that would mean in terms of wear and tear on machinery, tools and other equipment. Others soon found out. Reports came to state and Federal administrative and supervisory officers responsible for vocational training that shop equipment was "taking a beating" under the intensive, all-out-for-defense training program.

Since the matter of getting the most production possible out of machines and tools operated for defense training purposes is a matter of vital importance, not only to our armed forces but to all of us, a discussion of how to maintain school-shop equipment under constant and often heavy use appears to be timely.

The secret of maintaining school shop equipment in good condition lies largely in the realm of everlasting watchfulness, coupled with thorough knowledge and right ideals.—Underlying careful, specific instruction in how to take care of machines and tools, and how to prevent accidents, there must be basic concepts of why things are done as they are, and how variations therefrom may waste material, destroy equipment, and injure human life. Keeping machinery fit will be discussed in the following paragraphs.

Selecting Equipment

For long-lasting equipment we school people need to learn that carefully selected, representative advisory committees, composed of equal numbers of representatives of employers and of labor, can help greatly not only in the wise selection of equipment, but also in securing competent craftsmen to operate it. More than 1,500 such representative advisory committees are assisting vocational school administrators in the United States.* Advisory committees should be appointed for the defense training program in rural as well as in urban centers.

It is quite obvious, and still overlooked at times, that equipment should be selected for the use to which it is put. A light-duty machine cannot be expected to hold up as well as a more sturdy one under heavy use. It is probable that an appreciable amount of relatively light, portable equipment originally purchased for industrial arts classes or for other light use is being used during evening hours for vocational de-

* For a full discussion, see Misc. 2801 *Representative Advisory Committees*, U. S. Office of Education, Washington, D. C., January 18, 1941.

Preemployment training in precision lathe operation at the Bok Vocational School, Philadelphia. Training such as these men are getting will help to keep precision instruments in good working order in industry and in vocational and technical schools

Courtesy of Charles F. Bauder

These boys are getting special training in testing and keeping radio equipment in good working order in one of the public vocational high schools of Kansas City, Mo.

Courtesy of U. S. Office of Education

fense training. Where this is the case, careful handling of such machines is especially needed. This includes proper oiling, right handling, and avoidance of overloading.

In the light of the present scarcity of some essential tools and machines, a word of caution may not be out of order against uncritical acceptance of substitute equipment. If a lathe of a certain quality is specified, make sure that you get it or one that is truly its equivalent.

Purchasing second-hand equipment is much like purchasing a second-hand automobile. An expert machinist, like an expert auto mechanic, knows where to look for wear on used equipment, and to a certain extent such wear can be recognized when the machine is standing on the sales floor, but it is suggested that second-hand equipment should be secured from persons or dealers of known reliability who will guarantee their products rather than depend upon the word of persons whose reliability is not known. There are just as many tricks in the trade of selling second-hand machinery as there were in former years in horse-trading. It should be remembered that even though a dealer may make good on faulty equipment purchased from him, there is an investment in time that is involved.

Record-Keeping

It is essential that for the equipment in every school shop there should be a "live" record—one that is constantly kept up to date. A record card or sheet kept for inventory and other purposes should usually show, among other things, such facts as these: (a) name and description; (b) from whom and how acquired; (c) when acquired; (d) price paid; and (e) present condition and value. Other items needing recording will be suggested by the nature of the equipment. A record can be an unnecessary burden as well as a practical help. Let it be such as is of evident worth. We need to be on our guard against needless recording.

Systematic Inspection

It is noteworthy that a school shop has much in common with production shops. To get out maximum production, there must be constant alertness and day-to-day checking. This principle is illustrated by an incident related by Major Silas M. Ransopher, of the Office of Education, who has had a rich and varied experience with industrial and defense training equipment. He tells the story of a shop superintendent whose quantity of production was so constant week after week and month after month that it looked as if he were juggling figures in his reports. When the case was investigated, the superintendent explained how he was able to produce goods so consistently. He said: "Every morning before my men start on production work they carefully check every piece of equipment in detail. We don't wait for a machine to break down; we see to it that it is kept in good running order." Then he added: "I get a production report on every machine every day. If production isn't back to normal the second day, I check it personally. I do not wait until the end of the week or of the month to find out that some of our equipment is not in perfect condition."

For maximum production all parts of machines and tools that are subject to wear need to be examined not only frequently, as has already been said, but in a thoroughly systematic manner. Such work can usually be routinized. The best order and procedure can be determined and followed. The machine operators can be held responsible for the simpler forms of inspection, but time and money can often be saved by having expert diagnosticians, such as high-grade machinists and tool-makers, who can spot causes of trouble long before they become evident to the average machine operator, inspect equipment at frequent intervals.

Some vocational schools and departments have efficient maintenance departments manned by expert mechanics, who overhaul and repair equipment that is reported to them as being out of order. In some instances the maintenance staff is undermanned; in such cases there is no time for careful checking on equipment in operation; no surveys may have been made of the condition of machinery and tools in actual use; the service may be unfortunately limited to repairing equipment after it breaks down. This is placing the emphasis in the wrong place. *Prevention is less costly than repair.* If weakness or wear is recognized in its early stages, the school may be able to plan for reconditioning or for replacement in such ways as will save time and money. For example, it is learned that a working part, such as a cam, gear or lever, is showing evidence of wear to the degree where replacement will soon be called for. Instead of trying to purchase it in an uncertain market, or having it made by the maintenance staff, it might be routed through the appropriate shop operating under the regular Smith-Hughes aided program in time to be available when needed.

Breakage Reports

One way to keep a constant check on the physical condition of machinery and tools consists of encouraging all trainees to be on the constant lookout for evidences of wear, defects, breakage and losses. Trainees can be made responsible for making such reports. Where machines, tools, or instruments are used by a number of persons successively during a 24-hour period, each individual can be expected to examine

Right—Student in vocational defense training class at the Williamsport Vocational School. Trainees are taught how to keep machines in proper working order

Below—A view of a modern machine shop at the Timken Vocational High School, Canton, Ohio. Trainees are getting thorough instruction in how to operate and maintain machine tools

Courtesy of U. S. Office of Education

Left—Trainee in the defense training program at Williamsport, Pennsylvania, making necessary adjustment on lathe before beginning work

Below—Showing how properly designed, solid foundations are used to assist in long-time, efficient operation of electrical machinery in a school shop

Courtesy of U. S. Office of Education

his working equipment carefully at the beginning of his shift and be held to report at once any part that is missing or not in good condition. Such a procedure helps to place the responsibility for the misuse or loss of instruments or other equipment. It serves as a double check in that each learner is constantly striving to leave his equipment in good condition, and it also makes each person responsible for checking the equipment used by the person who used the same equipment on the preceding shift. Such reports can be made orally, directly to the instructor or to a qualified assistant who may have charge of such matters. A simple record form for filing all reports in writing will prove helpful especially where the instructor has large classes.

Trainees should be led to understand that injury or breakage can be reduced but not eliminated entirely, and that it is much better to report such matters than to try to cover them up.

Proper Supervision

A first principle in industrial management is that careful, systematic supervision and checking are necessary to insure products of the highest quality. In like manner, it is a truism in education that proper supervision helps to up-grade training programs. It is our conviction that one of the best ways of making sure that machines and tools used in vocational training for national defense are kept in the best possible condition is to see to it that teachers, local directors of vocational education, principals of trade and industrial schools, and others responsible, make more frequent and more thorough examination of the condition of machines, tools and equipment used than is now done in many schools.

At present, relatively few school systems have as complete, detailed and up-to-date records of the exact condition of their machine tools and other equipment essential to national defense as is needed. Unless careful and continuous studies are made in this phase of defense training, many schools will not only operate at reduced efficiency, but will find themselves, at the end of the emergency, with much damaged and worn-out equipment on hand. Our suggestion is to prevent wear as much as possible through integrated effort and to keep equipment in good running order through all known means. The details must be worked out on the basis of each set-up.

Who Is To Do Repairs?

A question that frequently arises is, Why not have instructors in defense training classes keep their own machinery and equipment in repair? It is clearly logical to have all instructors and trainees do their part toward properly oiling and otherwise keeping equipment in good working order. But when it comes to making major repairs, the viewpoint of many directors of defense training is that one cannot expect shop teachers under the defense training program to do this, for two important reasons, namely: (1) The trainees come there for highly specialized instruction. If they were competent to repair machines or other major equipment they ought to be in industry, or with the armed forces, not in defense training classes. (2) The instructors in large measure are men from the trade who have had but little professional training for teaching. They are so busy giving their enthusiastic adult trainees what they must have, and in trying to master the essentials of good teaching procedures, that they do not have the time or energy to overhaul equipment either in, or after, class hours. Teachers handling Smith-Hughes classes may help.

In general, instructors handling pre-employment refresher courses are likely to find it more difficult to keep equipment in good running order than are teachers handling groups getting supplementary training. Among the latter group of trainees may be found some who, under proper supervision, may be able to do serious overhauling of major equipment, and such repair work may fit into their training schedules.

State and Federal Cooperation

From July 1, 1940, through May, 1941, $8,000,000 has been allotted to Federally aided vocational schools for equipment. During 1941-42, $20,000,000 additional funds are budgeted for defense training. This does not include N.Y.A. or C.C.C. Much of this equipment is held in trust by the various State Departments of Education for the United States Government. Both the Federal Government and the various State Boards for Vocational Education have the right to know, and it is their duty to ascertain from time to time, the condition of this equipment and to what extent it is serving the purposes for which it was assigned.

In spite of much that can be done to reduce wear on equipment used intensively for defense training purposes, many schools are likely to find, when the emergency is over, that their equipment has suffered considerably through much use. When that time comes, the Federal Government is likely to have in its possession many machine tools and other equipment needed by the schools that have operated under the defense training program. What better use could be made of that equipment than to make it available to the schools? It would compensate in a measure for wear brought on through training for national defense; it would also make such equipment available in serving vital training needs for the immediate future.

PRACTICAL ARTS IN THE PUBLIC SCHOOLS

By ELMER W. CHRISTY

Director of Industrial Arts, Cincinnati Public Schools

PRACTICAL Arts in the Cincinnati Public Schools is a program of handwork which is carried on in a shop equipped for this particular purpose and directed by a teacher who is a specialist in this field of activity. It is part of the regular program for boys and girls in the fourth, fifth, and sixth grades. Experimentation indicates that boys and girls have many common interests in the use of tools and materials. They work together profitably in these activities, just as they do in other phases of the school program. Therefore, a combination course has been introduced in which boys and girls work together in a shop or a laboratory equipped for a wide variety of construction activities.

The purpose of the new course is to provide boys and girls with an opportunity to learn how to manipulate and control materials, and to acquire an understanding of the processes involved in changing these materials to satisfy their needs and interests. Emphasis is given to activities related to the lives of children at this stage of their development. In other words, an effort is made to closely relate the practical arts activities to the contemporary interests of boys and girls in the fourth, fifth, and sixth grades. The ability to use tools and materials will also help pupils to correlate the Practical Arts program with other school subjects.

The introduction of the Practical Arts program is an outgrowth of the reorganization of the Cincinnati elementary schools to make them more nearly self-contained units, and to eliminate the need for itinerant teachers. Specifically, Practical Arts has to do with those school activities that require the use of tools and materials which can be provided for and handled more economically and more effectively in a room or shop equipped for that purpose than in various classrooms under the direction of different teachers.

The reorganized program of elementary education in Cincinnati provides for the following allotments of time:

Physical Education ..	100 minutes per week
Music	" " " "
Practical Arts	" " " "
Esthetic Arts	" " " "

The general objectives of Practical Arts are:

To help children attain knowledge, attitudes, habits, skills, and understandings essential to life in a technological society.

To provide opportunity for manipulating and controlling many types of materials and tools, and for exploring many production processes.

To provide a background of understandings and concepts that will put meaning into reading and discussion in other subjects.

To contribute to the development of useful, wholesome, and enduring leisure-time interests and activities.

Practical Arts Program

The Practical Arts program is of two types: one provides experiences which in themselves are of value to pupils; the other is correlated with the work of various classroom teachers. Both types of work seem to be essential in order to maintain a continuous program for the Practical Arts teacher, to whom classes come on regular schedule. Boys and girls are usually much interested in activities involving the use of tools and materials. By engaging in them, children reveal individual aptitudes, acquire worth-while skills, and become informed about many materials which contribute to their lives, their homes, their work, and their play. However, Practical Arts in elementary schools makes its best contribution when classroom teachers and Practical Arts teachers work together in developing a correlated program.

Correlation offers a fine opportunity for the development of group projects involving the work of part or all of the pupils in a class, or it may suggest Practical Arts projects to be undertaken by individual pupils. Because of the value of associated ideas, opportunities for correlation should be given preference over a program centered entirely in the Practical Arts shop.

Practical Arts is primarily an activity subject. It differs from academic subjects in that it requires the use of materials and tools as means of expression.

Tools are a creation of man. They have been developed to do certain things in the shaping of materials. The best way to use tools has been discovered by experience, and these methods are a heritage to which our pupils should have access without the necessity of discovery.

Working with tools and materials requires related knowledge and information frequently of a special type. With such information available, the wasteful practice of trial and error can be avoided to a considerable degree.

The comparative freedom of a Practical Arts shop presents a peculiar problem of its own in maintaining

proper discipline. This suggests a type of organization and shop arrangement in which cooperative effort is encouraged and the individual responsibility of pupils demanded. Only in this way can an orderly and effective organization be maintained.

Shop Planning

The proper housing of a Practical Arts program requires a room with about 1,200 square feet of floor space located as near the center of school activities as possible. The Cincinnati plan divides this space into areas, each of which will accommodate from 8 to 10 pupils. The areas are separated by partitions about 3½ feet high. The purpose of these separate areas is to confine the tools and materials for any type of activity to the space in which they should be used, thus simplifying the problem of management. By limiting the height of partitions, all parts of the room are visible from any point. When classes have as many as 45 pupils, this means that all areas must be in operation simultaneously. In order to avoid a lock-step program, the practice is to permit as much freedom of choice as possible on the part of the pupils without overcrowding one or more of the areas.

Areas are provided for metal work, woodwork, ceramics, textiles, basketry, paper work, painting, and a planning unit equipped with a table, bookcases, and reference books which pupils may consult without leaving the room.

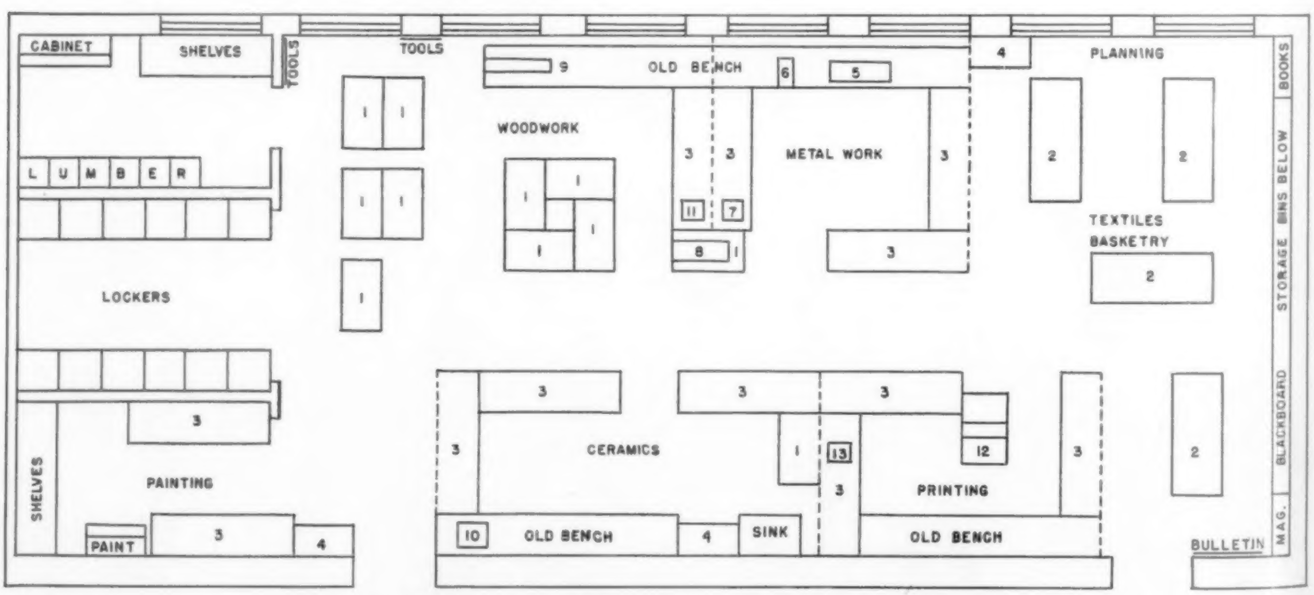
Practical Arts shops have been established in 23 schools. All these are modifications of rooms in buildings now in use, and all vary in size and arrangement. There is, however, a general scheme which is carried out in each case.

So far we have been fortunate in being able to secure spaces of 1,200 or more square feet. In planning the arrangement, the ceramics area is placed first near the water supply. The other areas are distributed throughout the room so as to make the best use of natural light and other details already established in the building, such as storage cabinets, cupboards, etc.

Formerly, both Industrial Arts and Household Arts rooms were equipped to take care of 24 pupils. Since the Practical Arts program supplants the former Industrial Arts and Household Arts program for fifth and sixth grades, it is necessary to provide additional work stations to take care of the combined classes of boys and girls.

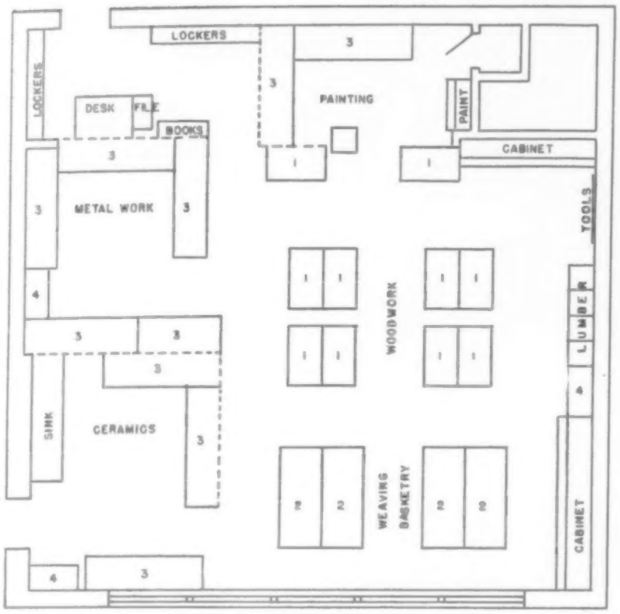
The partitions previously referred to serve to separate the areas and to keep supplies and equipment in their proper areas. The use of a general tool room is usually abandoned, in favor of keeping tools in their respective areas. In addition to separating the areas, the partitions also serve as supports for these tools and certain other types of equipment.

The use of standard steel double-door wardrobes, 3 feet wide, 6 feet high, and 18 inches deep, has proved to be the most satisfactory and economical means of storing supplies and unfinished projects.



Practical Arts and Industrial Arts for an Eight-Grade School

1. Standard woodwork bench, 30 inches high
2. Masonite-top table, 30 x 72 x 30 inches high
3. Masonite-top bench, 24 x 84 x 30 inches high
4. Steel wardrobe, 36 x 72 inches
5. Sand box for molding
6. Gas furnace
7. Drill press
8. Jig saw
9. Wood-turning lathe
10. Ceramic kiln
11. Double tool grinder
12. Type-case stand
13. Printing press, 6 x 9 inches



Above—Practical Arts shop for grades four to six at Kilgour School

Left—Practical Arts shop for a six-grade school
1. Standard woodwork bench, 30 inches high
2. Masonite-top table, 30 x 72 x 30 inches high
3. Masonite-top bench, 24 x 84 x 30 inches high
4. Steel wardrobe, 36 x 72 inches

These cupboards are located in the various areas according to the particular needs. They supplement any built-in storage cupboards which the building provides. Items of equipment which are more than 42 inches high are usually placed against a wall to avoid obstruction of the complete visibility of all parts of the room.

The general plan of these shops has some features quite at variance with standard classroom arrangements. Reference to the floor plans shows how a central aisle provides access to the various areas on either side. This arrangement makes maximum use of the floor space for work stations. The major items of equipment consist of woodwork benches 24 inches by 42 inches, tables 30 inches by 72 inches, and special benches 24 inches by 84 inches. The latter consist of a framed top of 2 x 4-inch yellow pine covered with $\frac{3}{4}$-inch plywood, on which is cemented $\frac{1}{8}$-inch tempered masonite. The top is supported by two steel legs. This long bench is quite sturdy and its dimensions have fitted in conveniently in the forming of the various areas.

Combination Industrial Arts and Practical Arts shop for grades four to eight at Cummins School

Seventh and Eighth Grades

In the Cincinnati Schools about half of the boys and girls in the seventh and eighth grades are in regular junior high schools, but the other half are in elementary schools. The programs of these eighth-grade schools provide 200 minutes per week of Industrial Arts for boys and the same time for Household Arts for girls. Industrial Arts for boys has been provided for by means of various items of power-driven equipment in the Practical Arts shop. This permits the development of a program far beyond that which fourth-, fifth-, and sixth-grade pupils would undertake. In other words, in schools having eight grades, the shop serves both Practical Arts and Industrial Arts classes. Power equipment is used only by the seventh- and eighth-grade Industrial Arts pupils. Because of additional activities and the use of power-driven equipment, the combined Practical Arts and Industrial Arts shop requires at least 1,500 square feet.

One of the accompanying pictures illustrates a Practical Arts shop for fourth, fifth, and sixth grades. In this case lack of space in the main building required the use of a separate building. The other picture illustrates a combination Industrial Arts and Practical Arts shop for fourth-, fifth-, and sixth-grade boys and girls, and for seventh- and eighth-grade boys. The ceramics area and that part of the room which is equipped with tables does not show in this picture.

Reference to the floor plans of two other school shops, on which the broken lines indicate the low partitions, will give a better idea of the space divisions than is shown in the pictures.

THE USE OF FLUORESCENT LIGHTING IN SCHOOL BUILDINGS

By E. L. LOUNSBERY

Assistant Superintendent in Charge of Business, Dayton Public Schools, Dayton, Ohio

PRACTICALLY every school administrator in the metropolitan areas, at one time or another, is confronted with the problem of improving the lighting facilities in the classrooms and special departments of the schools. To a great extent the solution of these problems depends upon the ability of the particular school district to finance an adequate program of improved lighting conditions. In some instances limited funds require that attention be focused on certain departments of the school, such as shops, drafting rooms, sight-saving classrooms, etc., where greater quality and quantity of light is more needed to protect the vision of the pupil. Generally, improvements are made by an increase of the number of light outlets, improved glassware, and increased wattage, or by replacing old installations with semi-indirect or indirect lighting fixtures which produce a greater diffusion of light in the room and a better-balanced quantity of light at all pupil stations. Such installations are costly to install, increase the wattage considerably, and likewise increase consumption of electric current and the ultimate cost to the school system.

Not long ago, fluorescent lighting was introduced to the public for commercial installations, window lighting, and factories. Experimental work for this type of lighting had developed to the point where its practicability was reasonably assured, but it was obvious that certain refinements would have to be made to broaden the scope of its use for other purposes. It was predicted that in time fluorescent lighting would probably revolutionize our thinking in terms of adequate lighting for schools; and today, wherever school administrators gather, discussions take place about the merits of the fluorescent light for school use. It is a timely topic.

Better Light Needed

Not unlike other cities, we were confronted with this problem about two years ago, and we felt it unwise to accept the indirect method of lighting on a large scale, in the face of the developments in the fluorescent field. Several installations had been made in some of the factories and commercial institutions in Dayton, so a careful study was made of the use of the fluorescent light to determine whether it had the proper attributes to merit experimental use to meet the problems at hand.

Drafting-Room Light

Our greatest need, about a year ago, seemed to be the improvement of the lighting in our drafting room at Parker Vocational High School. This school conducts day and night classes, and is housed in a not-too-modern building with poor facilities for lighting. Early in 1941 we removed five 300-watt totally enclosed lighting fixtures and replaced them with fifteen 100-watt Daylight Fluorescent units. These new fixtures were of the reflector type with open ends, and the reflector face was aluminum finish. The location for each unit was carefully planned to provide the greatest footcandle power per square foot at pupil stations, and the light curves produced by these fixtures were used as a factor in determining the location and the height of the fixture off the floor. With the old installation the average footcandle reading per square foot was 6.5, with a very poor distribution of light throughout the room. After installation of the fluorescent units, the footcandle power showed a reading of 36.0 footcandle power per square foot, with a very even distribution throughout the room. Whereas the old fixtures produced bright spots with a conical light curve, the new fixtures produced a broad distribution of light, so that each pupil station received its maximum. The fixtures were mounted 7 feet 6 inches from the floor and on 6-foot centers. Four months after the installation of the fixtures the readings of the light meters showed an approximate loss of 20 per cent, which still left a definite advantage over the old Mazda installation.

The new fluorescent lights have produced a better quantity of light with practically no glare on the working plane. Students and instructors alike are very enthusiastic about the change in this facility, and feel that we have found the answer to their problem. It will be noted from the above, that this improvement was made without increasing the total wattage in the room, and consequently the cost of current remained the same. The entire cost of making the change, including the fixtures, amounted to approximately $300. Our investigations have shown that we receive at least 2½ times more lumens per

watt than with the Mazda lamps, for the same wattage. No cases of eye strain or defective eyesight have been reported since these lights were installed.

The Lighting of Vocational Shop Rooms

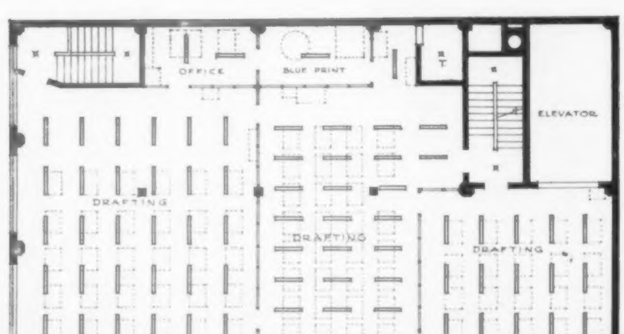
Having attained satisfactory results from the above installation, we were encouraged to go further into the use of fluorescent lighting, and accordingly, when the Dayton Board of Education purchased a six-story factory-type building for the expansion of the shop facilities of the vocational high school, and to provide space for the National Defense Training Program, we planned the building for fluorescent lights. We occupy five floors of the building at present, two of which are used for machine shops, one for welding and aeronautics, one for auto mechanics, and one for tool designing and drafting. Each floor is approximately 47 feet by 85 feet and is equipped with fluorescent lighting in accordance with the need for light. The following schedule indicates the number of lights placed on each floor, and figures A and B are typical illustrations of the location of the lights with respect to pupil stations.

Floor	Shop	No. of Fixtures	Wattage
Second...	Machine Shop............	50	5000
Third....	Machine Shop............	50	5000
Fourth...	Aeronautics and Welding...	30	3000
Fifth.....	Auto Mechanics..........	20	2000
Sixth.....	Trade Extension..........	75	7500

All fixtures are 100-watt units, open-end reflector type, with aluminum surfaces. In every case we

Left—The drafting rooms at Parker Annex, illuminated with fluorescent lighting

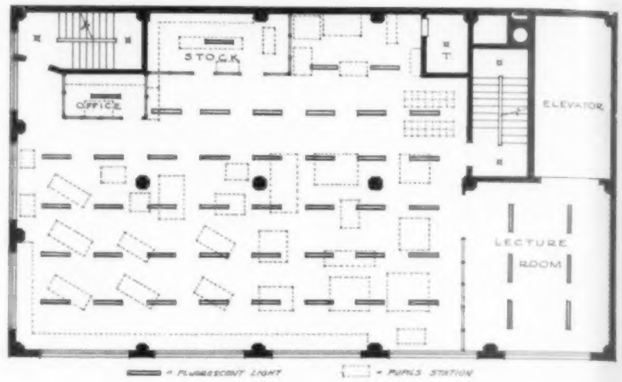
Below—Figure A. Plan indicating the location of the lights with respect to pupil stations in the Trade Extension floor at Parker Annex



have provided for better than 30-foot candlepower per square foot of pupil station area, and produce this without glare or shadow. Ceiling heights are approximately 10 feet, and fixtures are placed about 7 feet 6 inches off the floor. The shops in this building operate 24 hours per day, National Defense classes being conducted throughout the night. Obviously, good lighting is essential for this purpose, and in turn will tend to produce greater efficiency in all courses. This installation has met with widespread enthusiasm throughout the school system and the building is acclaimed by many institutions in Dayton as one of the best-lighted in the city. No criticism has been received from any source about the quality of the light.

Lighting for Administration Building

About three months ago the Board of Education decided to remodel the old Steele High School Building, which had been closed the summer of 1940, for use as administrative offices of the Board of Education. The planning of adequate lighting for the offices became one of the major problems of this change.



The electrical work was reserved from the general contract, so the responsibility of planning and installing the lighting fell to this department. Here was a problem which hardly compared with the use of fluorescent lighting in the Annex building of the vocational high school mentioned above. Ceiling heights in the main offices were 15 feet, and in the corridors 13 feet. Planning the old high-school building for use as offices required the breaking-up of large classrooms into offices by partitioning. To stay within

Top of page—Figure B. Plan indicating the location of the lights with respect to pupil stations in the machine shops at Parker Annex

Above and right—The machine shops at Parker Annex. Note that the fluorescent units produce a good light, without glare or shadow

The office of the assistant superintendent in charge of business at Dayton, illustrating the use of fluorescent lighting

our estimates, the partitioning cost had to be balanced with the space required to meet the needs, and in proportion to the ceiling heights. As planned, the offices are larger in area than the average business office, and the corridors are 22 feet wide and 200 feet long. Two floors of the building are occupied for our use. The generous amount of space assigned made it necessary that we have adequate general lighting, supplemented with portable or desk-type lamps at typewriting stations and over accounting machines. We planned the corridor lighting to give sufficient light for average office traffic, without too great a wattage and resultant cost in consumption of electricity. It was evident that these lights would burn 90 per cent of the working hours, and we concluded that the initial cost of installing fluorescent fixtures, with its resultant low cost in consumption of electricity, would be far more economical in the long run than equipping the corridors with the old type of Mazda lamp and enclosed glassware, with its greater wattage and higher cost of operation. The first-floor corridor is equipped with six 100-watt fluorescent fixtures, and the second floor with five fluorescent lighting fixtures. These fixtures provide all the light that is necessary for the general use of the public and the travel of employees to and from their offices.

Each principal executive office is equipped with one 200-watt fluorescent fixture, and each subordinate office with a 100-watt fixture. In a few cases, where concentrated lighting is needed, 200-watt fixtures have been placed in the subordinate offices. All the fixtures selected for the administrative offices are more ornate in design than those used in the aforementioned buildings. The lamps in the fixtures selected for the executive offices are enclosed in ribbed glass with ornamental aluminum end plates. The others selected for use in the general offices have no enclosure, but ornamental aluminum end plates to match those in the executive offices. All 200-watt lamps are so designed that two lamps can be removed and the fixture used as a 100-watt lamp. This gives sufficient flexibility if alterations are necessary and light outlets have to be moved. Eighty-two fluorescent light fixtures were installed in the building at an approximate cost of $1,200 for the fixtures. Every office is adequately lighted and each employee is enthusiastic about the quality and quantity of light. The building has an abundance of windows, and consequently excellent daylight conditions prevail, but when artificial light is needed, on dark days or late afternoons in winter months, there is a generous quantity of light produced by the fluorescent fixtures. The working conditions have been materially improved through this medium, and it is reasonable to assume that greater efficiency exists. It is estimated that the wattage for the 82 fixtures installed is about one-third of the wattage that would be required to produce a reasonable quantity of light with the old Mazda lamp and glass-enclosure type of fixture, and at the same time, the lumen output is about 2½ times greater than the light that would be produced by the Mazda lamps.

Fluorescent Lighting Satisfactory

The results obtained so far, from installations mentioned in this article, have so encouraged us that we anticipate further installations of fluorescent fixtures as our finances will permit. Surely, any particular problem of lighting we have will be met with the conviction that the problem can best be solved by fluorescent lighting. We do not recommend fluorescent lighting unless it is planned to produce at least 30-foot candlepower, since our experience shows that below that figure the installation would not be as economical for the amount of light obtained. From our experience, lamps deteriorate 20 per cent during their life, which is guaranteed to be 1,000 hours. If we can produce 30 footcandles or more of light, we can afford to lose that 20 per cent during the life of the lamps; but the loss of efficiency can be decreased by periodical re-

placement with new lamps. Another advantage, we have learned from our experience with the fluorescent fixture, is that it is much easier to clean and maintain than the old glass-enclosed fixture. The fluorescent lamp can be easily removed and cleaned, which leaves the reflector surface exposed for cleaning, whereas the old lamp fixture required the removal of the glass enclosure for cleaning, and, in some cases, the removal of the bulb itself.

Fluorescent lamps do not give off as much heat as the Mazda lamps at the same wattage. This feature is particularly noticeable with desk lamps at typewriting stations, where the person has to work close to the lamp. It is also true, and was a factor in our deliberations, when planning the lighting for the Trade Extension floor, as shown in Figure B. On this floor the student's head is approximately 3 feet below the fixture, and a concentration of light in Mazda lamps, with equivalent wattage, would throw off so much heat that it would become almost unbearable for the student. The cool light produced by fluorescent lamps is ideal where work by artificial light is done near the source of illumination.

The designs of the fluorescent fixtures now on the market are more suitable for the modernistic types of offices, schools, and other public buildings now being designed, and we anticipate a greater variety of designs in the future. How far-reaching the use of the fluorescent lamp will be, is hard to predict, but on the basis of progress made in the past two years it is reasonable to assume that before long it will be almost universally used for school lighting, and in time, for residential use as well.

The use of the fluorescent type of lighting for school purposes requires the serious consideration of several factors, such as ceiling heights, room areas, location of pupil stations, type of instruction, height of working plane in relation to height of fixture, and the placement of fixtures to avoid glare and shadow. There are many types of fluorescent fixtures on the market today, suitable for school use, but care must be exercised in selecting the proper fixture to meet the conditions for which it will be used. The reflecting surface is very important, and the high power factor auxiliary should bear the underwriters approval and inspection label. This certifies that the fixture meets the standards of the National Electrical Code. Most fluorescent lamps on the market operate on twin ballast high power factor units, with a rating of 95 per cent, with the lamps out of phase, to eliminate flicker. The efficiency with which fluorescent lamps operate today has practically eliminated all flicker.

It is generally believed that the first cost of installation of this type of lighting is relatively high, but the resultant low cost of operation soon offsets this factor. We intend to make more installations of fluorescent lighting as our finances will permit; and we feel the experience gained through the work done so far has proved that we can furnish a better quality of light for the same cost. We look forward with interest to the developments that are now being made by illuminating engineers, and predict that future improvements will produce greater efficiency. Although sight-saving authorities in many states are reluctant at this time to change their standards for sight saving to include fluorescent lighting, we hope that serious consideration will be given to this matter in the near future. Perhaps our experience will contribute, with the experience of other cities, to the experimental work being conducted, so that standards can be developed and used by school administrators to solve their lighting problems.

THE BLACK & DECKER MFG. CO.

Towson, Maryland

BRANCHES IN

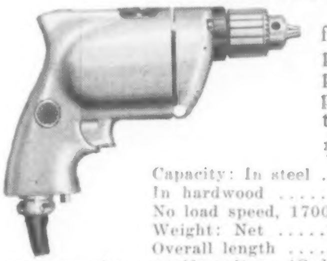
Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Los Angeles

Black & Decker
ELECTRIC TOOL HEADQUARTERS

BRANCHES IN

Memphis, Minneapolis, New Orleans, Newark, New York, St. Louis, Oakland, Philadelphia, Pittsburgh, San Francisco, Seattle

HOLGUN ELECTRIC DRILL

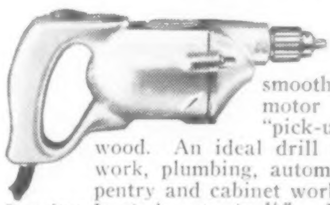


An all-purpose drill—perfectly balanced, perfectly proportioned, of surprising compactness and smooth, rugged power for heavy duty production work.

¼" HOLGUN

Capacity: In steel .... up to ¼"
In hardwood .... up to ½"
No load speed, 1700 R.P.M. Full load, 900 R.P.M.
Weight: Net ..... 2¾ lbs. Shipping ... 4¼ lbs.
Overall length .... 6¾" Spindle offset ... ¾"
Price, complete, specify voltage (Code No. 345) $32.50

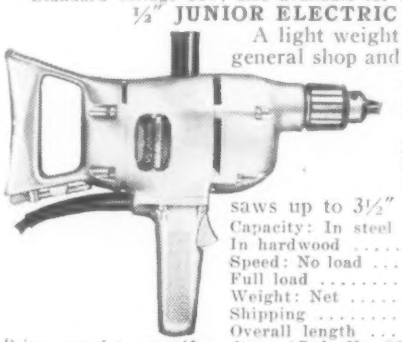
¼" JUNIOR ELECTRIC DRILL



Designed for intermittent service in shops and for maintenance work. "Compo" oilless bearings for smooth operation. Its powerful motor will handle hundreds of "pick-up" drilling jobs in metal and wood. An ideal drill for tool kit in maintenance work, plumbing, automotive repair, electrical, carpentry and cabinet work and on the work bench.

Capacity: In steel .... up to ¼" In hardwood .... up to ½"
Speed: No load ..... 1800 R.P.M. Full load .... 1050 R.P.M.
Weight: Net .... 3¾ lbs. Shipping .... 5 lbs.
Overall length .... 10¾"
Price, complete, specify voltage (Code No. 30) $19.95
Standard voltage 110; also available for 32, 220 or 250 volts.

½" JUNIOR ELECTRIC DRILL



A light weight tool designed for the general shop and for intermittent service in maintenance and repair work. "Compo" bearings for years of smooth service. Spindle speed ideal for driving hole saws up to 3½" capacity.

Capacity: In steel .... up to ½"
In hardwood .... up to 1"
Speed: No load .... 375 R.P.M.
Full load .... 240 R.P.M.
Weight: Net .... 9⅛ lbs.
Shipping .... 11¾ lbs.
Overall length .... 14¼"
Price, complete, specify voltage (Code No. 38) $35.00
Standard voltage 110; also available for 32, 220 or 250 volts.

VACKAR ELECTRIC VACUUM CLEANER

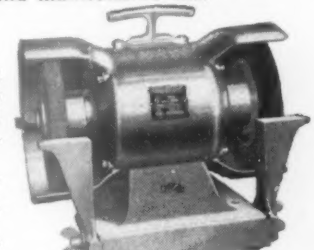
The No. 95 Vackar is a super-powered cleaner for both automotive and industrial use. With both inlet and outlet hose connections, it can be used as a vacuum cleaner or a blower. Recommended for use with the Lectro-Kleen Process as motor and mechanism are completely protected from moisture and unharmed under such use. Ideal all-purpose cleaner for heavy-duty service in garages, super-service stations, wash-racks, etc.

Dimensions: Height .... 28"
Top Diam. .... 16¼"
Base Diam. .... 18½"
Sealed Vacuum Pull .... 65"
Weight: Net .... 52 lbs.
Shipping .... 67 lbs.
Price, complete, specify voltage (Code No. 425) $137.50
Standard voltage 110; also available for 220 or 250 volts.

ELECTRIC BENCH GRINDERS

Black & Decker Bench Grinders now present the most complete line of quality service grinders at popular prices. There are four units ranging in size and price to meet every grinder requirement in general shop and maintenance use.

6" JUNIOR BENCH GRINDER



A full quality Black & Decker unit with ball bearings throughout, wheel guards, tool rests and convenient handle—unusually low in price.

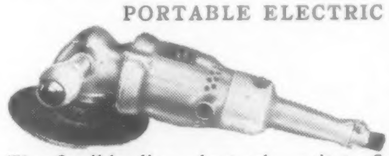
Wheel size .... 6" x ⅝" x ½"
Motor rating .... ¼ H.P.
Not universal
Price for all 1-phase A.C. voltages and cycles $22.50

6" HEAVY DUTY BALL BEARING BENCH GRINDER

For heavy duty service and longer life this unit is equipped with ball bearings, also enclosed wheel guards, tool rests and handle.

Wheel size .... 6" x ¾" x ½"
Motor rating .... ⅓ H.P.
Not universal
Price for 110 volts, 50-60 cycles,
Single phase A.C. voltages only $38.00
All D.C. voltages only 42.00

PORTABLE ELECTRIC SANDERS



For all types of metal surfacing, Portable Electric Sanders greatly reduce operating time and produce smoother surfaces. The flexible disc adapts the unit to flat or curved surfaces.

7" JUNIOR

For intermittent service in paint shops, metal working shops and foundries. Not recommended for continuous production use.

Diameter of disc .... 7"
No load speed .... 3700 R.P.M.
Weight: Net .... 7¾ lbs.
Shipping .... 12 lbs.
Overall length (not including pad) ..... 14¾"
Price, complete, specify voltage (Code No. 91) $39.50

ELECTRIC VALVE SHOP

This Valve Shop is the most complete "package" of precision valve reconditioning equipment on the market. It is available in 14 different combinations of equipment, adapting it to the shop requirements and pocketbook of any shop doing valve work. Contains everything necessary for a complete valve job on Passenger Cars, Trucks, or Airplanes, does the work right at the engine, and helps you sell valve work to your customers.

Complete line includes: Drills, Drill Stands, Hole Saws, Screwdrivers, Nut Runners, Tappers, Hammers, Saws, Glue Pot, Bench Grinders, Die Grinders, Portable Grinders, Shears, Sanders, Buffers, Vacuum Cleaners, Valve Shop, Valve Refacers, Valve Seat Grinders, Valve Lapper and Supplies. **COMPLETE CATALOG SENT ON REQUEST.**

STANLEY ELECTRIC TOOL DIVISION

THE STANLEY WORKS

New Britain, Connecticut

STANLEY
"VICTOR" DRILL
No. 124—½" Capacity

A most practical size electric drill for the School Shop. Round shank twist drills and bits, hole saws, countersinks, plug cutters, etc., can be held in this three-jaw geared chuck. Complete line of electric drills, sizes ¼" up to ⅞".

DRILL STANDS

There is a Stanley Drill Stand available for any Stanley Electric Drill. They make a practical combination for the School Shop.

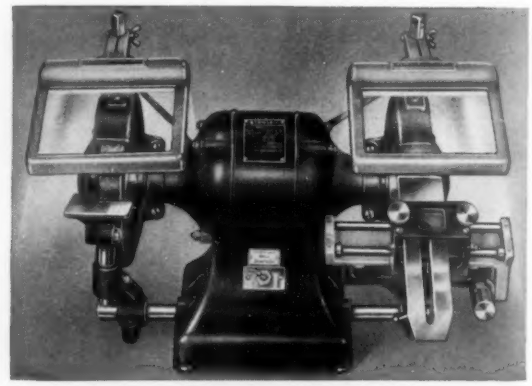
"MIGHTY MIDGET" UNISHEAR

Motor driven hand shear — easier to handle than a pair of snips. Cuts 18 gauge hot rolled steel or galvanized iron as fast as you can feed it. Cuts large sheets or small pieces easily. 100% safe.

HAND ROUTER
No. 10
18,000 R. P. M.

Adds the professional touch to projects. High speed produces smooth work—sanding practically unnecessary. It will perform countless woodworking operations — shaping, inlay work, routing, templet work, veining, relief work, grooving, rabbeting, corner beading. Bench Stands and Attachments available for converting to a spindle shaper.

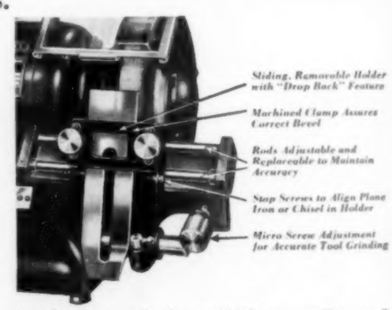
Write for Stanley Router-Shaper Catalog.



EDGE TOOL GRINDER No. 677

Ideal for the School Shop. Ball bearing, 7" x 1" wheels — one wheel specially designed for edge tool grinding, one wheel for general purpose grinding. Motor operates at slow speed. Equipment includes Plane Iron and Chisel Grinding Fixture, "Flud-Lite" Safety Eye Shields.

PLANE IRON AND CHISEL GRINDING FIXTURE No. 568



Designed to keep edge tools in perfect condition easily and accurately. Furnished with Nos. 677 and 667 Stanley Grinders

"FLUD-LITE" SAFETY EYE SHIELDS No. 600

Fit Bench and Belt-Driven Grinders

Offers greater visibility and maximum protection for grinder operator. Adjustable up or down, and tilt to suit operator's position. Cannot be moved to non-guarding position without dismantling. Throws light directly on grinding wheel and work. Two light bulbs can be connected so that lights go on or off as grinder switch is operated.

Send for Electric Tool Catalog with complete information on Drills, Grinders, Electric Hammers, etc.

STANLEY TOOLS

EDUCATIONAL DEPARTMENT

New Britain, Conn.

STANLEY "Boy Proof" TOOLS

FOR WOODWORKING AND FARM SHOPS • ELECTRICAL SHOPS • FORGE SHOPS SHEET METAL SHOPS • AUTOMOBILE SHOPS • MACHINE SHOPS

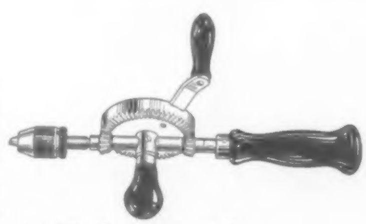
No. 52½ 10 Oz. HAMMER

Super heat treated head. Evertite oil treated handle of selected straight grain hickory. Patented wedges.

No. R40 EVERLASTING CHISEL

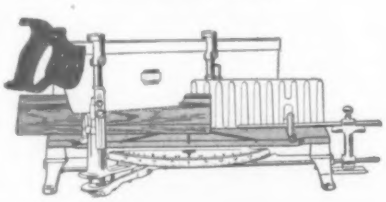
No lost or battered handles. Rubber composition handle, practically unbreakable, moulded about shank. Blade, shank and head one piece of finest steel.

No. 617 HAND DRILL



New chuck with hairpin type springs. Heavy crank, solid wheel, several other important features. ¼" chuck capacity. Hand Drill No. 626 has ⅜" chuck capacity.

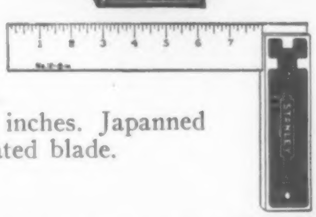
No. 2246 MITRE BOX



Simplified design. Swivel and uprights one piece of malleable iron. Malleable iron saw guides with roller bearings.

No. 80M SCRAPER

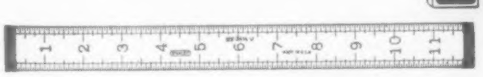
Practically unbreakable. Body and handles one piece of malleable iron.



No. 12 TRY SQUARE

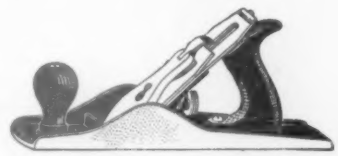
Graduated in eighths of inches. Japanned finish handles. Nickel-plated blade.

No. 34½V BOX-WOOD RULE



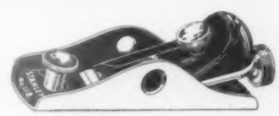
Improved vertical figures—easy to read in any position. One side graduated in eighths of inches—other side in sixteenths. Brass tips protect ends.

No. 5¼ JUNIOR JACK



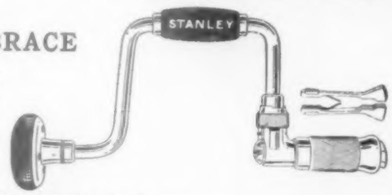
Well balanced, lightweight. Ideal size for Junior High School student.

No. 118 BLOCK PLANE



All steel. Minimum number of parts. Lowest cutting angle.

No. 919 BIT BRACE



Self - centering chuck, all parts locked in place. Bronze bushed ball bearing head. Made with 8, 10, 12 and 14 inch sweep.

No. 20 SCREW DRIVER

Standard blade. Blade, shank and head hot forged from one piece of steel.

No. 340 SOLDERING IRON

Electric—95 watts. Pure copper tip. Hermetically sealed heating unit. Hardwood, adjustable handle. Armor clad tip optional at slight increase in cost.

•

SEND FOR

SPECIAL

SCHOOL CATALOG

NO. 34

Catalog 34, in its 240 pages, contains much useful material in addition to complete descriptions and specifications on Stanley Tools. Get your copy free and use it as a handbook for tools and their use.

* * * * * *

Write for Information on
STANLEY VISUAL TEACHING AIDS

BROWN & SHARPE MFG. CO.

B·S

Providence, R. I.

"World's Standard of Accuracy"

B·S

Long-Lived Machines with Accuracy and Versatility

MILLING MACHINES

Universal — Plain — Vertical, including toolroom and manufacturing types.

GRINDING MACHINES

Universal — Plain — Surface — Cutter and Tool.

SCREW MACHINES

Automatic and Wire Feed (Semi-Automatic).

Detailed Specifications of any size or type of machine gladly sent on request

Investigate the No. 2 Light Type Universal Milling Machine (shown above) —an ideal machine for the school shop
. . . *convenient height*
. . . *easily operated*
. . . *individual Motor Drive*

■ ■ ■

The Popular Brown & Sharpe Universal Grinding Machines (shown at left) are universally selected for shop instruction because of their versatility

BROWN & SHARPE MFG. CO.

B·S

Providence, R. I.

"World's Standard of Accuracy"

B·S

Reliable Precision Tools, Cutters and Other Shop Equipment

MACHINISTS' TOOLS

- Micrometers
- Calipers
- Rules
- Verniers
- Gages
- Indicators

MILLING CUTTERS

- Plain Milling Cutters
- End Mills
- Face Mills
- Slitting Saws
- Gear Cutters
- Hobs

OTHER USEFUL SHOP EQUIPMENT

- Arbors and Collets
- Screw Machine Tools
- Ground Flat Stock
- Surface Plates
- Magnetic Chucks
- Vises
- Pumps

Catalog of complete line on request

MILLERS FALLS COMPANY

Greenfield Massachusetts

28 Warren St., New York City — 100 So. Jefferson St., Chicago, Ill.

Note: In view of the probable shortage of tools as America's war effort progresses, it is to the advantage of every school shop to select quality equipment that will stand up in long, strenuous service. Choose Millers Falls tools, standard items in vocational training as well as in industry. Available through school shop suppliers everywhere. Write for catalogs.

HAND AND BREAST DRILLS

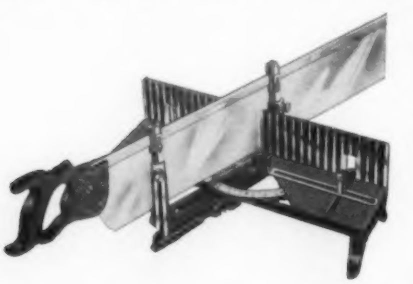
Straight and ratchet, enclosed gear, single and two-speed — 27 models. Bench drills and boring machines.

PLANES

An unbeatable line, developed through 74 years of quality tool-building. Many kinds and sizes —smooth, jack, fore, jointer, block, rabbet, router, rabbet and fillister, scrub, and scraper.

MITRE BOXES

Complete line of mitre boxes, metal-cutting boxes, portables, open fronts. Best known are the famous Goodell All-Steel and Langdon Acme — high quality, great value.

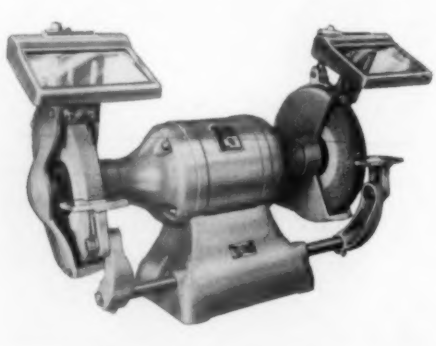


LEVELS

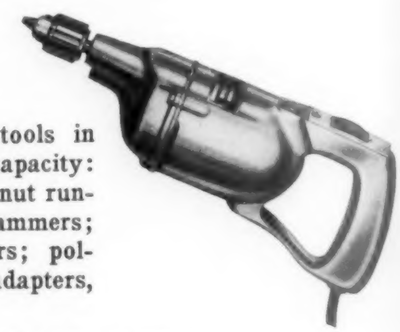
For every purpose and condition of service; 18 wood models, 5 iron, others.

BENCH GRINDERS

Complete line—$\frac{1}{3}$ h.p. to full 1 h.p. All voltages, cycles, single or three-phase. Eye-shields, lights, pedestals.



ELECTRIC DRILLS



Complete line— $\frac{3}{16}''$ to $1''$. Other portable electric tools in every speed and capacity: screw drivers and nut runners; grinders; hammers; saws; disc sanders; polisher. Stands, adapters, accessories.

HACK SAWS

Finest frames ever made, many sizes and styles. Blades for all uses: Tuf-Flex, general-purpose hand blade, super-tough, super-flexible, cuts thin-walled tubes or tough tool-steel rods without stripping or breaking. Blu-Mol Double-Life, sensational new blade with cutting edges on each side, now in widespread industrial use, should be demonstrated in every school shop.

PRECISION TOOLS

Combination squares: precision ground, etched graduations and figures, with and without level and scriber. Also: rules; micrometers; thickness gauges; calipers and dividers; screw pitch, depth, center and surface gauges; squares; sets; and bevel protractors.

BRACES AND AUGER BITS

Finest line of braces made: standard, ratchet, corner, whimble, angular; auger handles. All kinds and sizes of auger bits: solid center, single twist, expansive, electrician's, ship; car bits, gimlets, countersinks, etc.

THE LUFKIN RULE COMPANY

Saginaw, Michigan, U. S. A.

NEW YORK: 106-110 Lafayette Street

LUFKIN

PRECISION TOOLS:

- Micrometers
- Squares, Combination, etc.
- Calipers
- Dividers
- Steel Scales
- Indicators
- Protractors
- Bevels
- V Blocks
- Clamps
- Hold Downs
- Scribers
- Rules, Steel
- Punches, Center & Drive Pin
- Gages:
  - Center
  - Depth
  - Drill Grinding
  - Feeler
  - Planer
  - Radius
  - Screw Pitch
  - Shaper
  - Surface
  - Telescoping
  - Thickness
- Tool Chests
- Tool Sets, Students

MEASURING TAPES:

- Chrome Clad Steel
- Nubian Finish Steel
- Stainless Steel
- Engineers Steel
- Surveyors Chain
- Metallic and Other Woven Tapes
- Pocket, Steel & Woven

STEEL TAPE-RULES:

- Flexible—Rigid

RULES:

- "Red End" and Other Spring Joint
- Aluminum Folding
- Boxwood & Caliper
- Steel and Brass
- Manual Training Etc., Etc.

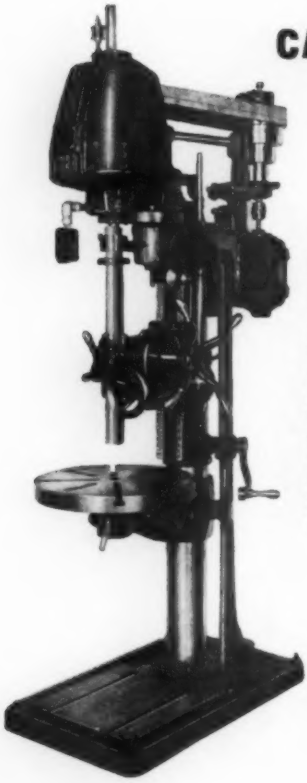
CANEDY-OTTO MANUFACTURING CO.

Manufacturers of Precision Equipment Since 1892

General Offices and Factory: Chicago Heights, Illinois

New York Branch: 407 Broome Street, New York City

CANEDY-OTTO DRILLING PRECISION BUILT UNITS



C.O. 21" Sliding Head *Motor Driven* Floor Drill

This general-purpose floor drill is an outstanding value for the machine shop: sturdily constructed, full anti-friction bearing equipped, precision built. Spindle, table and base retain perfect alignment throughout years of use. Available with geared power feed and back gears, or with lever feed only. Drilling capacity in cast iron 1⅓".

C.O. No. 16 Royal Bench Drill *Motor Driven*

Meets the most exacting requirements, producing accurate work at minimum cost. Primarily designed as a metal working tool, it is also adaptable to woodworking; can be used for sanding, mortising, grinding and routing. Drills holes up to ½ inch, to center of 16¼ inches. Five speeds: 5200-2835-1632-917-460 r.p.m.; with slow speed pulley, 385-732-1240-1950-3110 r.p.m. All ball-bearing equipped.

C.O. No. 18 Royal Floor Drill *Motor Driven*

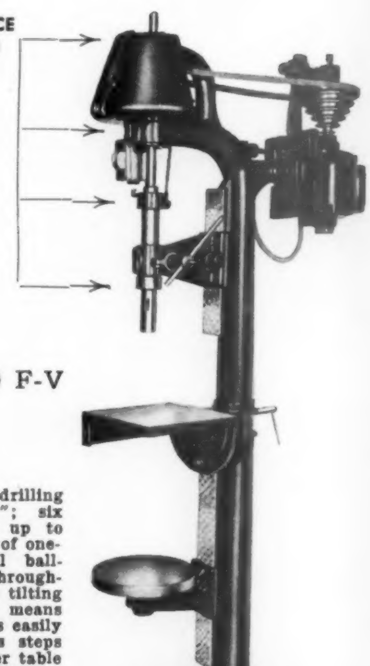
This general-purpose sensitive drill, also designed for producing accurate work at minimum cost, has drilling capacity in cast iron of ¾-inch with ½-hp. motor, 1800 r.p.m.; ⅞-inch with ¾-hp. motor, 1800 r.p.m.; and 1 inch with ¾-hp. motor, 1200 r.p.m. Six speeds. Full ball-bearing equipment.

Write for illustrated bulletins

C.O. No. 21" Stationary Head "V" *Belt Motor Driven* Drill

This drill is particularly adaptable for automobile repair shops, as the height, distance from spindle to table and base, and general range, permit its use for cylinder reboring of any type or size of internal combustion motor. The brace, or supporting arm, gives additional support and strength for capacity drilling. With the back gear, 8 speeds are obtained. Drills to center of 21" circle, from 0 up to 1⅓ inches.

4 BALL RACE BEARINGS



C.O. 14" 3000 F-V *6-Speed Sensitive* Floor Drill

This drill has a drilling capacity of ⅝"; six speeds, from 345 up to 3205 r.p.m.; frame of one-piece casting, full ball-bearing equipped throughout; exclusive C-O tilting motor bracket, by means of which the belt is easily changed to various steps of the pulley; upper table capable of being swiveled through 360 degrees around the column, and 90 degrees from its horizontal position; lower table capable of rotating on its axis.

OLIVER MACHINERY COMPANY

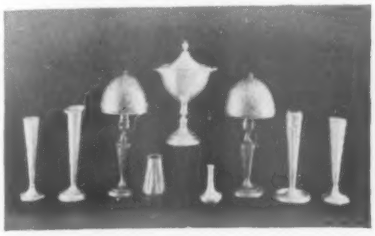
Grand Rapids, Mich.

BRANCH OFFICES

50 Church Street, New York City
1450 N. Monitor Avenue, Chicago

901 Bank of Commerce Building, St. Louis
221 Sexton Building, Minneapolis

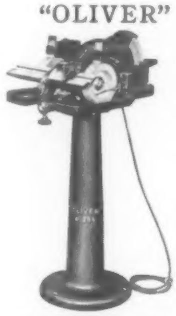
METAL SPINNING DEVELOPING RAPIDLY



It is easy to learn and the art possibilities are unlimited. Ask Oliver about Metal Spinning.

Metal Spinning Lathes by Oliver have been developed to the point of Leadership in this line. Lathes are powerful. Boys love the work. Lathes can be used for wood turning also.

"OLIVER" OILSTONE TOOL GRINDERS



Junior with 6" Wheels

Every shop using edge tools should have an Oilstone Grinder.

No. 585, illustrated at right, carries two 8" Oilstone wheels, a dry grinding wheel and emery cone.

"OLIVER" CIRCULAR SAWING MACHINERY

Built in sizes from large, heavy saws to junior models. The "Oliver" No. 232D Tilting Arbor Saw Bench is illustrated. It carries 12 or 13" saws. Motor arbor. Table 33¾ x 34¾.

Other types of "Oliver" saws are Universal Saw Benches, Miter Saws, Variety Saws, Cut-off types, etc.

Important Note: It is impossible with so large a line as the "Oliver" to put specifications into such a small space. We will gladly send to inquirers specifications and literature fully describing any machines in our line.

HIGHER SHOP STANDARDS WITH "OLIVER"

Write for descriptive literature

The "Oliver" No. 144 Hand Planer and Jointer, illustrated, is built in 6" and 8" sizes.

It has won acceptance everywhere because of its modern and sturdy design and because of the fine workmanship and precision built into it.

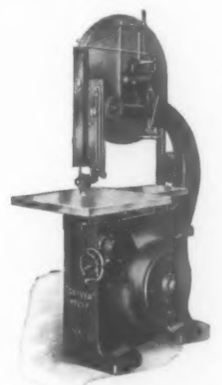
A large line of Jointers from a lighter 6" type up to the biggest and heaviest jointers for production or pattern work are to be found in the "Oliver" line.

Special attention in designing has always been given to safety features. Let our broad experience be used in helping to plan your woodworking shops.

"OLIVER" WOOD LATHES

are built in many types and sizes from largest pattern makers' lathes to junior sizes. No. 51, illustrated at right, is a 12" motor head speed lathe giving all speeds from 600 to 3600 r.p.m.

"OLIVER" BAND SAWS



Full line from largest high speed band saws to 18" Junior. We illustrate our popular 30-inch, No. 217.

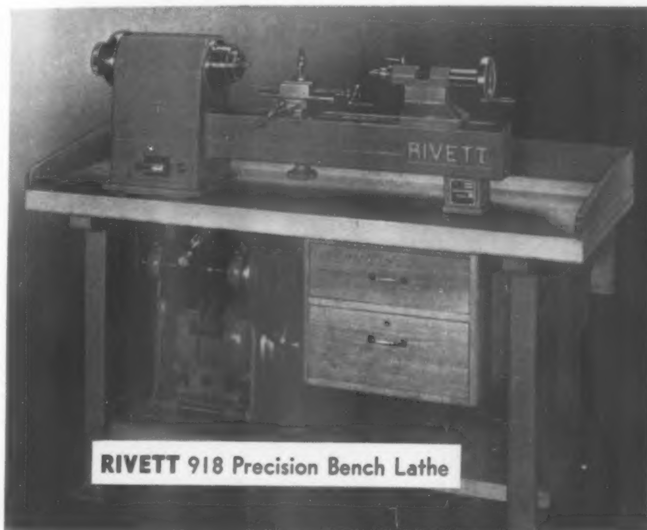
No. 299 Surfacer is illustrated at right.

Ask for Details and Prices on "Oliver"

Circular Saw Benches	Sanders (Specify Type)
Band Saws	Boring Machines
Band Saw Brazers	Mortisers
Jig Saws	Tenoners
Carving Machines	Shapers
Surface Planers	Wood Trimmers
Jointers	Oilstone Tool Grinders
Wood Lathes	Electric Glue Pots
Metal Spinning Lathes	Woodworkers Vises

RIVETT LATHE & GRINDER, INC.

RIVETT — Brighton, Boston, Mass., U. S. A. — RIVETT



RIVETT 918 Precision Bench Lathe

RIVETT 608 Screw Cutting Lathe

RIVETT 918 Hand Screw Machine

RIVETT 715 Precision Bench Lathe

RIVETT PRECISION BENCH LATHES

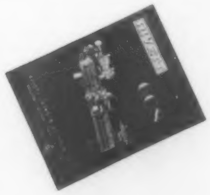
There is no finer machine than a Rivett bench lathe for teaching true precision and basic fundamentals required for a sound foundation in any skilled machinist trade. For more than fifty years Rivett precision bench lathes have been favorably known the world over. Their presence in a laboratory or instruction room adds a mark of quality and denotes the highest standards.

RIVETT 608 SCREW CUTTING LATHE is recognized by technical instructors of machine shop practice as the finest demonstrator for teaching construction, working principles and functions of lathes. Basically "608" is a small but exceedingly powerful engine lathe with available attachments to accomplish practically every machining operation within guaranteed precision limits. "608" has 8½" swing, 1" collet capacity and 40" bed.

RIVETT 918 BENCH LATHE AND HAND SCREW MACHINE combines the features of rugged construction, long lasting precision and operating convenience. Ball bearing spindle and dynamic balance permit vibrationless spindle speeds within the range of drive selected. As a bench lathe "918" is fitted with compound slide rest and tailstock, as a hand screw machine it is fitted with turret and cross slide. "918" has 9" swing, 1" collet capacity and 39½" bed.

RIVETT 715 BENCH LATHE is a small lathe incorporating the latest in modern design to attain high spindle speeds, long precision life and vibrationless performance. No better machine could be chosen for teaching tool and die work. The grinding and milling attachments extend the machining operations that can be performed. "715" has 7" swing, ¾" collet capacity and 33" bed.

For Further Description Write for Bulletins



WALKER-TURNER CO., INC.

22 Berckman Street Plainfield, New Jersey

MACHINE TOOLS FOR METAL, WOOD, PLASTICS

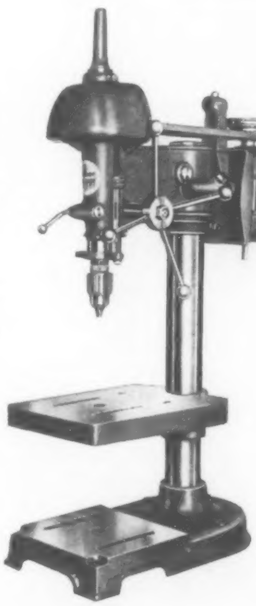
Drill Presses • Band Saws • Bench Saws • Tilting Arbor Saws • Jointers • Disc Surfacers • Jig Saws • Radials • Spindle Shapers • Lathes • Grinders • Flexible Shafts

Walker-Turner Machine Tools are the ideal equipment for school shop and vocational training. They are practical production machines which have established a new trend throughout industry in speeding up lighter operations. The simplified design of Walker-Turner Machine Tools makes them easy to operate, therefore students learn faster. Every possible safeguard has been included to protect against injury to operators. All machines are compactly constructed—accurate in operation.

Production-line methods of manufacture in a large, modern plant devoted exclusively to light machine tools, has brought the cost of Walker-Turner Machine Tools well within the most limited budget. Equally important, this standardized, volume production permits prompt shipment to meet the critical needs of your Defense training program.

DRILL PRESSES

Available in several bench and floor models, incorporating the efficiently designed Drill Head features shown at the right. Compare with other drill presses before buying. Standard speeds, with 1740 r.p.m. motor, 600, 1250, 2440 and 5000 r.p.m. Also slower speed models. Calibrated depth stop, positive locking device, 4-spoke Pilot Wheel Feed. Model shown has spindle travel 3⅝"; chuck to table 12"; chuck to column 7½"; drills to center of 15" circle; height 39½", width 10", depth 25". Floor models, 69" high, 25" deep. Foot feed available.



20" DRILL PRESS with Power Feed

Compact, smooth, positive Power Feed powered from drill press spindle, operates through clutch and engages at any point regardless of spindle position. Automatic trip and return. Four feeding speeds: .003", .006", .009" and .012" per spindle revolution. Precision drilling at speeds from 260 to 5200 r.p.m. Dimensions: Head, front to back, with guard 32"; width 14"; height (floor model) 74". Table working surface 14" x 18".

DRILL HEAD CONSTRUCTION

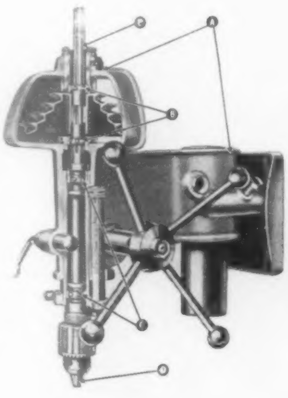
A. One piece head casting, precision bored for correct bearing alignment.

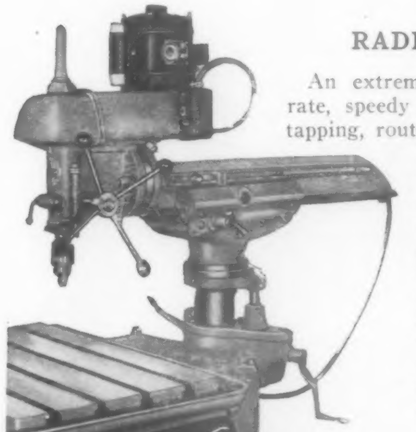
B. Straddle - mounted pulley prevents spindle "whip."

C. Precision deep-groove ball bearings.

D. Jacobs Chuck selected for maximum accuracy.

E. Oil at one lubrication point reaches all moving parts of spindle.





RADIAL DRILL

An extremely versatile, accurate, speedy Radial for drilling, tapping, routing and light profiling. Does the work of Radials costing 5 to 6 times as much. Drills to the center of a 62" circle. Drill Head tilts 45° right or left. Accuracy well within all commercial and industrial tolerances. Overall height, with base, 68½"; width 31"; depth 58". Spindle travel 3⅝"; maximum traverse of ram, 18". Distance nose of chuck to table 13½". Standard spindle speeds 600, 1250, 2400 and 5000 with 1740 r.p.m., ½ h.p. single phase motor. Jacobs Chuck 0 to ½" or No. 1 Morse Taper. Machined table surface 28" x 19".

RADIAL SAW FOR METALS

Cuts, saws, trims, grooves, profiles, shapes and miters Ferrous and Non-Ferrous Metals, Ceramics and Plastics. Handles wide, flat materials, bulky pieces and many different shapes. Patented, geared motor gets shaft closer to work, permitting smaller cutting wheels with half the thickness. Height, with steel stand, 61"; floor space 4' x 5'; ram travel 21½"; vertical adjustment 8½"; working table, 17" x 45".

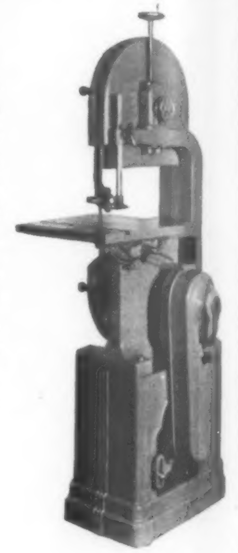
RADIAL SAW FOR WOOD, PLASTICS, NON-FERROUS METALS

For sawing, dadoing, shaping, routing, tenoning and other operations, according to attachments used. Has patented geared motor and other dimensions of Radial Saw above, but has maple table top, 46" x 24", rigidly supported by one-piece base. Rips 38" to cut material 4¾" deep with 12" blade. Blade fully guarded.

TILTING ARBOR SAW

Available in floor models (shown) and portable bench models. Equipped with patented, geared shock-proof motor or conventional Texrope drive. Heavycast iron and steel tilting assembly, using gun-type, jam-proof elevating mechanism. Vernier adjustment of ripping fence. Convenient fence locking lever. Heavy, welded steel base, fully enclosed, with clean-out door in rear. Table of gray iron, with top ground to plane surface; size, without extensions, 20" x 27"; with extensions 32" x 43"; two miter gauge slots ¾" x ⅜". Table tilts to 45°. Overall height (floor model) 35"; portable model (without sub-base) 18". Distance from front of table to 10" blade, without extension 13"; with extension 18". Capacity, depth of cut, 3".

METAL-CUTTING BAND SAWS

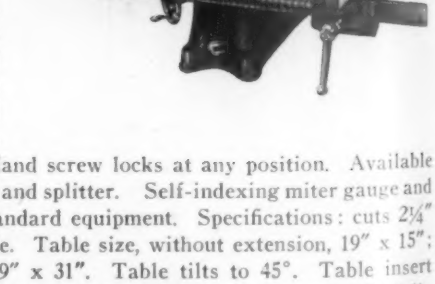


Cut and trim iron, steel, die steel, alloys, brass, aluminum, plastics, wood and other materials. Back-gearing and cone pulleys similar to those in screw cutting lathes, provide speed range from 61 to 5300 f.p.m. Table tilts 45°. Specifications: 16" MODEL: height, 71½", width 30½", front to back 22", table size 18" x 17", blade to frame 16", guide to table 12". 14" MODEL: height, 44", width 25¾", front to back 20", table size 16" x 16", blade to frame 14", guide to table 7".

BAND SAWS FOR WOOD, PLASTICS, NON-FERROUS METALS

These sturdy, accurate, extra-capacity Band Saws have heavy cast-iron, one-piece frame, efficient ball-bearing guides, patented blade-tensioning springs to absorb shocks, ample safeguards. Specifications: 14" MODEL: height, with base, 65", width 25¾", distance front to back 20", table size 16" x 16", blade to frame 14", guide to table 7", standard speed 2535 f.p.m. 16" MODEL: height, with base, 71½", width 30½", distance front to back 22", table size 18" x 17", blade to frame 16", guide to table 12", standard speed 2900 f.p.m. Tables tilt to 45° one direction, 5° the other.

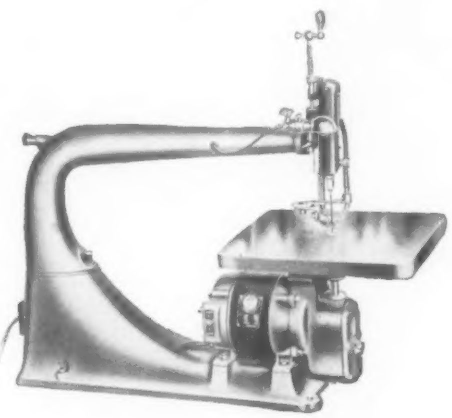
BENCH SAWS



An 8-inch Bench Saw of unusual strength, simplicity, convenience and depth of cut. Worm gears of lowering mechanism are housed to protect from dust and dirt. Hand screw locks at any position. Available with safety guard and splitter. Self-indexing miter gauge and steel rip fence standard equipment. Specifications: cuts 2¼" deep with 8" blade. Table size, without extension, 19" x 15"; with extension, 19" x 31". Table tilts to 45°. Table insert removable for dadoing. Base of heavy cast-iron, carefully machined. Has sawdust chute. May be used with cut-off wheels to cut metal and ceramics.

JIG SAWS

Available in two 24" direct drive models, single speed and two speed. Also 24" 4-speed model. Direct drive mechanism eliminates all pulleys and belts. Two-speed models may be shifted from low to high or high to low, without stopping motor. Operates with convenient switch. Patented



blade tensioner reduces blade breakage and permits varying tension without stopping machine. Entire driving mechanism lubricated from one point. Roller guide accommodates smallest fret blades or saber blades. Table tilts to 45°. Blower keeps table cleared of sawdust. Capacity: (direct drive models) Throat 24"; upper vise to table, with 8" blade, 2¾". Table of machined cast-iron, heavily ribbed, 15" x 14". Takes plain end blades up to ⅛" wide. Height, with stand, 54"; without stand, 29".

SPINDLE SHAPERS

In addition to shaping wood, aluminum and plastics, these Shapers, with varying accessories, may be used for sanding, dadoing, tenoning, reeding, fluting, panel carving and making lock corners. Geared motors operate spindles at 7600 r.p.m., assuring smooth, fast cutting. No belts to slip or replace. Reversing switches operate cutters either direction. Motors and elevating mechanism assembled as units and attached to under side of table. Vernier dial indicator on elevating control. Specifications: Floor Model S975 shown, height to top of table 35"; distance spindle to front of table, 14"; to rear of table 6"; to sides of table 13½". Table size 27" x 20". Elevating mechanism travel 2¾". Four interchangeable arbors for 5/16", ½", ⅝" and ¾" bore cutters.

VARIABLE SPEED LATHE

These rugged safe, extra-capacity Lathes have a variable speed drive as an integral part of head stock, providing spindle speeds from 260 r.p.m. to 4200 r.p.m., depending upon motor and motor pulley used. Spindle speeds controlled by hand wheel and shown on indicator. Wheel may be locked at any desired speed by instructor, for safety. Swing over bed 12"; over gap 15½"; distance between centers 38". Ample overload capacity for both thrust and radial loads. Head and tail stock centers have No. 2 Morse Tapers. Spindle run-out accuracy well within all commercial and industrial tolerances. Motor enclosed in special cast-iron base, protected from chips and dust. Smooth acting tool rest with permanently mounted clamping wrench.

JOINTERS

The compact self-contained 6" Model P910 shown has Texrope multiple V belt drive, new dual purpose guard, new hinged fence, quick-action fence locking lever. Cutterhead of solid steel carefully machined. Knives of selected steel,

honed to fine edge. Malleable iron fence, ground and polished, 29½" long, 4¼" high. Stops provided at 45° and 90° positions. Operating speed 4200 r.p.m. Length 37½", front table 17½", rear 15¼". Height, floor to table top, 34"; machine only 9½".

MOTOR GRINDERS

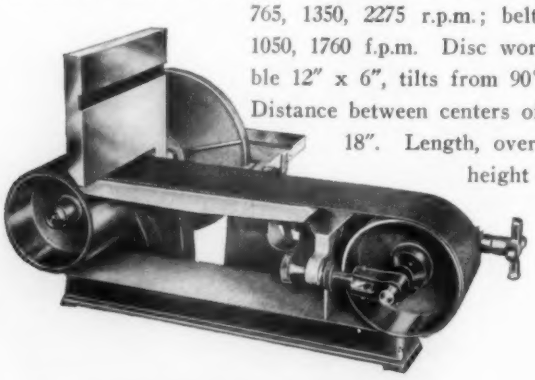
Motors are totally enclosed with special shaft seals to prevent abrasive dust from damaging vital parts. Precision, dust sealed ball bearings are used. All standard models operate at 3450 r.p.m. Model GR50, ½ H. P. Grinder shown with table and stand of cast-iron. Table is 18" x 14", with cooling cup at front center. Tool tray at either side of cup. Stand adjustable 12" up or down. Wheels are 7" in diameter, 1" wide, ⅝" hole. Full-protection guards designed to latest safety code requirements and have large, non-shatterable glass shields. Guards removable for buffing operations.

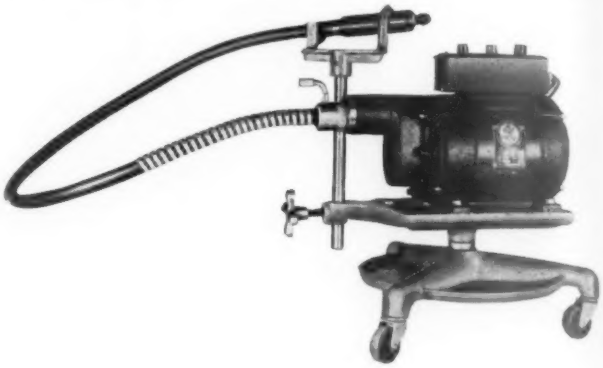
POLISHING LATHES

Especially adapted for high-speed polishing and grinding of small parts not exceeding 3" or 4". 2-speed geared, shock-proof motor, with push button control. Motors wound for 1½" H. P. in a 3 H. P. frame, ventilated with air inlet for cool, safe operation. Abrasive dusts do not enter motor. Jacobs chuck sizes ½" and ¾"; depths, 4½" and 4" universal. Speed ranges from 950 to 7200 r.p.m. Treadle foot brake for quick stops. Several other models available.

BELT AND DISC SURFACER

A compact, sturdy machine with built-in drive belt and pulley guard. Aluminum die-cast pulleys 5" diameter. Sanding belt 4" x 52½". Cast-iron sanding disc 10". Machine speeds 765, 1350, 2275 r.p.m.; belt speeds, 1050, 1760 f.p.m. Disc working table 12" x 6", tilts from 90° to 45°. Distance between centers of pulleys 18". Length, overall, 29"; height 16".





FLEXIBLE SHAFT MACHINES

Walker-Turner manufactures a complete line of Fexible Shaft Machines, Accessories and Flexible Shafting. These machines are adapted for grinding, snagging, drilling, sanding, polishing, wood carving and other applications. Available in heavy duty, medium duty and light duty shafts, in floor models, bench models and suspension models. Made in single speed models and the new 2-speed Geared Motor Model (shown above) which eliminates belts and pulleys. Provides speeds of 4000 to 8000 r.p.m. with simple push button control.

As one of the world's largest manufacturers of Flexible Shafting, Walker-Turner makes its own flexible shafting, including all parts. All shafting is extremely rugged, yet flexible. Cores are wound for maximum strength, flexibility and long life. Walker-Turner has exactly the Flexible Shaft Machine for your individual requirements.

Walker-Turner Machine Tools are stocked by distributors in all principal centers, who will be glad to give further details on any machines or to demonstrate them in their showrooms. Write us for name of nearest distributor. Complete catalog of Walker-Turner Machine Tools will be sent on request

LYON METAL PRODUCTS, INCORPORATED

General Offices, 1111 Madison Ave., Aurora, Illinois

FACTORIES: Aurora and Chicago Heights, Illinois
PLANTS: Los Angeles, Calif.; New York, N. Y.

SALES OFFICES IN ALL PRINCIPAL CITIES. CONSULT YOUR CLASSIFIED TELEPHONE DIRECTORY

Lyon Quality Steel Shop and Storage Equipment

FOR VOCATIONAL SCHOOLS

Lyon Products stand up under the most rigid tests for durability, safety, compactness, and performance.

SEND FOR CATALOG NO. 331

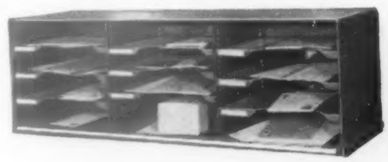
describing products on this page as well as:

LYON QUALITY STEEL . . .

Bench Legs	**Shop Tables**
Drawer Inserts	**Storage Cabinets**
Folding Chairs	**Tool Cabinets**
Lockers	**Tool Toters**
Shelf Boxes	**Wardrobe Cabinets**
Shelving	**Work Benches**

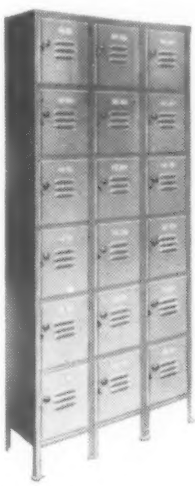
WELDING BENCH

Gas welding bench made of heavy gauge steel with provisions for fire brick working top. Dividers and space on shelf for storage.



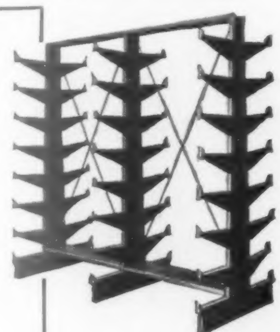
SORTING RACK

For storage of drawings, worksheets, sandpaper, emery cloth, and small tools. Shelves are hand adjustable every ½″. Recessed bottoms permits stacking of these units.



WOOD TOP WORK BENCH

Conserves floor area by providing storage space under bench top—out of the way and easily accessible to students. Eliminates congestion at store room or stock room entrance.



BAR RACKS

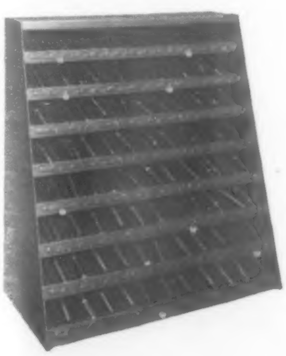
Built to store pipe, tubing, bars, rods and other long items. Available also in single face for use along walls.

PROJECT LOCKERS

Economical storage space for equipment, "work in progress," and students' work clothes. Will stand up through years of continuous use.

PORTABLE TOOL STAND

Ideal for bringing tools close to the project. Top may be used as a small bench. Flanged edges of top prevent tools from falling off. Available with or without drawers or casters.



TOOL STORAGE EQUIPMENT

A full line of specially designed cases for accessible and orderly storage and issue of tools. Adapted for use with commercial "check" system of control.

Write today for this new Lyon Catalog showing the most complete line of up-to-the-minute shop equipment.

STEEL STOOLS

Welded — no rivets to loosen. Unusually large seat—14″ square with 3″ radius rounded corner. Available with adjustable back, pressed wood seat pad, and four types of feet. 112 models.

SEE LYON AD ON PAGE 320

THE NEW BRITAIN MACHINE CO.

"New Britain" Shop Equipment — New Britain, Conn. — *"None Better" Tools*

SMOOTH TOP STEEL BENCH NO. 1901

"NEW BRITAIN" SHOP EQUIPMENT

The "New Britain" line of Steel Shop Equipment meets the increasing demand of schools for durable, splinter-proof, fire-proof shop benches. The understructure of every bench is all steel, arc-welded or electric spot-welded construction. Neat in appearance, easily cleaned, with dustproof legs and feet, solid, rugged, durable to an extreme, "New Britain" shop equipment will outwear and outlast by many years inferior wooden construction.

Send for Catalog 741 for details of work benches, glue and stain benches, welding benches, cabinet and locker benches, art and drawing tables, etc.

LAMINATED MAPLE TOP BENCH NO. 1909

This bench may be furnished in a zinc base electroplated for use as a glue or stain bench, or may be covered with sheet lead for use as a battery repair bench where acids are encountered.

"New Britain" Shop Benches, of all-steel construction, with **smooth steel** top, **laminated maple** top or **combination steel-and-laminated maple** top, may be set up **individually** or **as a continuous line of benching** (in multiples of any given length)—against a wall, around a corner, or in the middle of the floor.

"New Britain" Type "O" square tubular steel sanitary bench legs are used on all types of "New Britain" benches.

"NEW BRITAIN" Combined Cabinet and Locker Bench in a Continuous Bench Installation

This wood top bench may, if desired, be subjected to a special carbonizing treatment which renders it acid-resisting for use in a physics or chemistry laboratory.

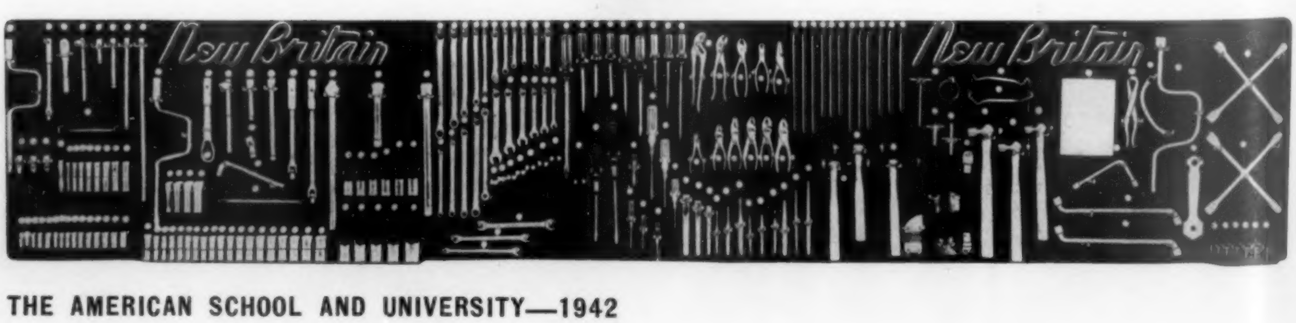
Built in more than 500 different sizes and combinations in standard lengths, widths and heights, also of special dimensions when required, "New Britain" benches cover any and all benching needs.

COMBINATION TOP BENCH (Top of steel and laminated maple)

Send for this new, complete Catalog No. 56 of "NEW BRITAIN" TOOLS:

CONTAINING THESE 15 SECTIONS

- Socket Wrenches
- Screw Drivers, Pliers
- Hacksaws
- Feeler Gauges
- Files, Flat and Curved
- Drills and Reamers
- Wire Wheels and Brushes
- Ford and Chevrolet Tools
- Carburetor Tools
- Piston and Valve Tools
- Ignition Tools
- Pullers, Gear and Wheel
- Forged Wrenches
- Body Repair Tools
- Service Station Tools



WICKES BROTHERS

Manufacturers of

Continuous Electric Blue Printing Machines

Saginaw, Mich.

Established 1854

MAKE YOUR OWN

Blueprints

FOR LESS THAN 1¢ PER SQUARE FOOT

REMARKABLE NEW *Simplex* BLUEPRINTER CUTS COST, SAVES TIME — NO EXPENSIVE EQUIPMENT. NO EXPERIENCE NECESSARY! • ACT NOW!

Don't give your money to outside firms for blueprints. With a Simplex Mercury Vapor-Tube Portable Blueprinter you can now make blueprints up to 42" wide (any length) in your own offices at a fraction of regular commercial prices. Model "D" (One mercury vapor lamp) has printing speed up to 24" per minute. Model "E" (Two mercury vapor lamps) has printing speed up to 48" per minute. Can be used for any of the Special Developing Processes. Requires no carbons or globes. Beautiful black crackle "Weaver" finish. Operates silently. Your office girl can easily operate a Simplex.

FREE TRIAL

FREE TRIAL! Don't take our word for the money-saving advantages of a Simplex! For a limited time only we will ship a regulation, complete Simplex Blueprinter on 30 days' free trial. Satisfaction guaranteed or money refunded. Write today for complete facts about this amazing, money-saving offer.

SECTION XII
COLLEGE, UNIVERSITY AND NORMAL SCHOOL PRESIDENTS

Alabama

City	Institution	President
Athens	Athens College	E. R. Naylor
Auburn	Alabama Polytechnic Institute	L. N. Duncan
Birmingham	Birmingham-Southern College	Raymond Ross Paty
Birmingham	Howard College	Harwell G. Davis
Birmingham	Miles College	W. A. Bell
Florence	State Teachers College	J. A. Keller
Jacksonville	State Teachers College	C. W. Daugette
Livingston	State Teachers College	N. F. Greenhill
Marion	Judson College	Leroy R. Priest
Montevallo	Alabama College	A. F. Harman
Montgomery	Huntingdon College	Hubert Searcy
Montgomery	State Teachers College	H. C. Trenholm
Selma	Selma University	Wm. H. Dinkins
Spring Hill	Spring Hill College	Wm. D. O'Leary
Talladega	Talladega College	Buell G. Gallagher
Troy	State Teachers College	Chas. B. Smith
Tuskegee Institute	Tuskegee Institute	F. D. Patterson
University	University of Alabama	

Arizona

City	Institution	President
Flagstaff	Arizona State Teachers College	Thomas J. Tormey
Tempe	Arizona State Teachers College	Grady Gammage
Tucson	University of Arizona	Alfred Atkinson

Arkansas

City	Institution	President
Arkadelphia	Henderson State Teachers College	Matt L. Ellis
Arkadelphia	Ouachita College	James R. Grant
Batesville	Arkansas College	T. M. Lowry, Jr.
Clarksville	The College of the Ozarks	Wiley Lin Hurie
Conway	Arkansas State Teachers College	Nolen M. Irby
Conway	Hendrix College	J. H. Reynolds
Fayetteville	University of Arkansas	Arthur M. Harding
Jonesboro	Arkansas State College	V. C. Kays
Little Rock	Arkansas Baptist College	Tandy W. Coggs
Little Rock	Philander Smith College	M. LaF. Harris
Little Rock	St. John's Home Missions Seminary	James P. Gaffney
Monticello	Arkansas Agricultural and Mechanical College	Marvin S. Bankston
North Little Rock	Shorter College	J. H. Clayhorn
Pine Bluff	Agricultural, Mechanical and Normal College	John B. Watson
Searcy	Harding College	George S. Benson
Siloam Springs	John Brown University	John E. Brown

California

City	Institution	President
Angwin	Pacific Union College	Walter I. Smith
Arcata	Humboldt State College	Arthur S. Gist
Berkeley	Pacific School of Religion	A. C. McGiffert, Jr.
Berkeley	University of California	Robert G. Sproul
Chico	Chico State College	A. J. Hamilton
Claremont	Claremont Colleges	Russell M. Story
Claremont	Pomona College	E. Wilson Lyon
Claremont	Scripps College	Ernest J. Jaqua
Fresno	Fresno State College	F. W. Thomas
La Verne	La Verne College	C. Ernest Davis
Los Angeles	Chapman College	C. F. Cheverton
Los Angeles	College of Medical Evangelists	Percy T. Magan
Los Angeles	College of Osteopathic Physicians and Surgeons	W. Ballentine Henley
Los Angeles	George Pepperdine College	Hugh M. Tiner
Los Angeles	Immaculate Heart College	Sister Mary Eucharia
Los Angeles	Loyola University of Los Angeles	Charles A. McQuillan
Los Angeles	Mount St. Mary's College	Sister Mary Dolorosa
Los Angeles	Occidental College	Remsen D. Bird
Los Angeles	University of Southern California	R. B. von KleinSmid
Oakland	College of the Holy Names	Sister Mary Aloyse
Oakland	Mills College	A. H. Reinhardt
Pasadena	California Institute of Technology	Robert A. Millikan, Ch. Exec. Council
Pasadena	Pasadena College	H. Orton Wiley
Redlands	University of Redlands	Elam J. Anderson
St. Mary's	St. Mary's College	Brother Austin
San Diego	San Diego State College	Walter R. Hepner
San Francisco	Golden Gate College	Nagel T. Miner
San Francisco	San Francisco College for Women	Mother Leonor Mejia
San Francisco	San Francisco State College	Alex. C. Roberts
San Francisco	University of San Francisco	William J. Dunne
San Jose	San Jose State College	T. W. MacQuarrie
San Luis Obispo	California Polytechnic School	Julian A. McPhee
San Rafael	Dominican College of San Rafael	Sister Mary Thomas
Santa Barbara	Santa Barbara State College	Clarence L. Phelps
Santa Clara	University of Santa Clara	Chas. J. Walsh
Stanford Univ.	Stanford University	Ray Lyman Wilbur
Stockton	College of the Pacific	Tully C. Knoles
Whittier	Whittier College	W. O. Mendenhall

Colorado

City	Institution	President
Alamosa	Adams State Teachers College	Ira Richardson
Boulder	University of Colorado	Robert L. Stearns
Colorado Springs	Colorado College	Thurston J. Davies
Denver	Regis College	R. M. Kelley
Denver	University of Denver	Caleb F. Gates, Jr.
Fort Collins	Colorado State College of Agriculture and Mechanic Arts	Roy M. Green
Golden	Colorado School of Mines	M. F. Coolbaugh
Greeley	Colorado State College of Education	G. W. Frasier
Gunnison	Western State College	C. C. Casey
Loretto	Loretto Heights College	Paul J. Ketrick

Connecticut

City	Institution	President
Danbury	Danbury State Teachers College	Ralph C. Jenkins
Hartford	The Hartford Seminary Foundation	Robbins W. Barstow
Hartford	Trinity College	Remsen B. Ogilby
Middletown	Wesleyan University	J. L. McConaughy
New Britain	Teachers College of Connecticut	Herbert D. Welte
New Haven	Albertus Magnus College	Sister M. Uriel
New Haven	Arnold College for Hygiene and Physical Education	H. B. Arnold
New Haven	Berkeley Divinity School	C. B. Hedrick, Acting
New Haven	Connecticut College of Pharmacy	Curtis P. Gladding
New Haven	New Haven State Teachers College	F. E. Engleman
New Haven	Yale University	Charles Seymour
New London	Connecticut College	Katharine Blunt
New London	United States Coast Guard Academy	James Pine
Storrs	The University of Connecticut	Albert N. Jorgensen
West Hartford	St. Joseph College	Mother M. Rinaldo Brennar
Willimantic	Willimantic State Teachers College	George H. Shafer

Delaware

City	Institution	President
Dover	State College for Colored Students	
Newark	University of Delaware	Walter Hullihen
New Castle	The King's College	Percy B. Crawford

District of Columbia

City	Institution	President
Washington	The American University	Paul F. Douglass
Washington	Catholic University of America	Joseph Corrigan
Washington	Gallaudet College	Percival Hall
Washington	Georgetown University	Arthur A. O'Leary
Washington	George Washington University	Cloyd Heck Marvin
Washington	Howard University	M. W. Johnson
Washington	National University	Leslie C. Garnett Chancellor
Washington	Trinity College	Sister Catherine Dorothea
Washington	Washington Missionary College	B. G. Wilkinson
Washington	James Ormond Wilson Teachers College	Walter E. Hager

Florida

City	Institution	President
Coral Gables	University of Miami	B. F. Ashe
Deland	John B. Stetson University	Wm. Sims Allen
Gainesville	University of Florida	John J. Tigert
Lakeland	Florida Southern College	Ludd M. Spivey
Tallahassee	Florida Agricultural & Mechanical College for Negroes	J. R. E. Lee
Tallahassee	Florida State College for Women	Doak S. Campbell
Tampa	University of Tampa	James Elliott Mooney
Winter Park	Rollins College	Hamilton Holt

Georgia

City	Institution	President
Albany	Georgia Normal College	J. W. Holley
Athens	University of Georgia	Harmon White Caldwell
Atlanta	Atlanta University	Rufus E. Clement
Atlanta	Clark College	James P. Brawley
Atlanta	Georgia School of Technology	Marion L. Brittain
Atlanta	Morehouse College	Benjamin E. Mays
Atlanta	Morris Brown College	W. A. Fountain, Jr.
Atlanta	Spelman College	Florence M. Read
Augusta	Paine College	E. C. Peters
Collegeboro	South Georgia Teachers College	M. S. Pittman
Decatur	Agnes Scott College	James R. McCain
Demorest	Piedmont College	Malcolm Boyd Dana
Emory University	Emory University	Harvey W. Cox
Forsyth	Bessie Tift College	C. L. McGinty
Fort Valley	The Fort Valley State College	H. M. Bond
Gainesville	Brenau College	H. J. Pearce
Industrial College	Georgia State College	B. F. Hubert
La Grange	La Grange College	H. T. Quillian
Macon	Mercer University	Spright Dowell
Macon	Wesleyan College	Arthur J. Moore
Milledgeville	Georgia State College for Women	Guy H. Wells
Mount Berry	Berry College	Gardner L. Green
Oglethorpe University	Oglethorpe University	Thornwell Jacobs
Rome	Shorter College	Paul M. Cousins
Valdosta	Georgia State Woman's College	Frank R. Reade

Idaho

City	Institution	President
Albion	Albion State Normal School	R. H. Snyder
Caldwell	The College of Idaho	W. W. Hall, Jr.
Lewiston	Lewiston State Normal School	Glenn W. Todd
Moscow	University of Idaho	Harrison C. Dale
Nampa	Northwest Nazarene College	Russell V. DeLong

Illinois

City	Institution	President
Alton	Shurtleff College	Guy Halbert Wimmer
Aurora	Aurora College	Theodore Pierson Stephens
Bloomington	Illinois Wesleyan University	William E. Shaw
Carbondale	Southern Illinois Normal University	Roscoe Pulliam
Carthage	Carthage College	Rudolph G. Schulz, Jr.
Charleston	Eastern Illinois State Teachers College	Robert G. Buzzard
Chicago	Chicago Institute of Technology	Henry T. Heald
Chicago	Central Y. M. C. A. College	Edward J. Sparling
Chicago	Chicago College of Osteopathy	R. N. MacBain
Chicago	Chicago Teachers College	John A. Bartky
Chicago	Chicago Theological Seminary	Albert W. Palmer
Chicago	De Paul University	Michael J. O'Connell
Chicago	George Williams College	Harold C. Coffman
Chicago	Loyola University	Samuel K. Wilson
Chicago	Mundelein College	Sister Mary Justitia
Chicago	Pestalozzi Froebel Teachers College	Herman H. Hegner
Chicago	St. Francis Xavier College for Women	Sister Mary Inez
Chicago	The University of Chicago	Robert M. Hutchins
Decatur	James Millikin University	John C. Hessler
De Kalb	Northern Illinois State Teachers College	Karl L. Adams
Elsah	The Principia College of Liberal Arts	Frederic E. Morgan
Elmhurst	Elmhurst College	Timothy Lehmann
Eureka	Eureka College	Burrus Dickinson
Evanston	National College of Education	Edna Dean Baker
Evanston	Northwestern University	Franklyn Bliss Snyder
Galesburg	Knox College	Carter Davidson
Greenville	Greenville College	H. J. Long
Jacksonville	Illinois College	Harris Gary Hudson
Jacksonville	MacMurray College for Women	C. P. McClelland
Joliet	College of St. Francis	Sister M. Aniceta
Kankakee	Olivet Nazarene College	A. L. Parrott
Lake Forest	Barat College of the Sacred Heart	Mother Eleanor Regan
Lake Forest	Lake Forest College	H. McComb Moore
Lebanon	McKendree College	C. R. Yost
Lisle	St. Procopius College	Procopius Neuzil
Macomb	Western Illinois State Teachers College	W. P. Morgan
Monmouth	Monmouth College	James H. Grier
Mundelein	St. Mary of the Lake Seminary	Reynold Hillenbrand
Naperville	North Central College	Edward E. Rall
Normal	Illinois State Normal University	R. W. Fairchild
Peoria	Bradley Polytechnic Institute	F. R. Hamilton
Peru	St. Bede College	Justus Wirth
Quincy	Quincy College	John Koebele
River Forest	Rosary College	Sister Mary Evelyn
Rockford	Rockford College	Mary A. Cheek
Rock Island	Augustana College and Theological Seminary	Conrad Bergendoff
Urbana	University of Illinois	A. C. Willard
Wheaton	Wheaton College	V. R. Edman

Indiana

City	Institution	President
Bloomington	Indiana University	Herman B. Wells
Collegeville	St. Joseph's College	Aloys H. Dirksen
Crawfordsville	Wabash College	Frank H. Sparks
Danville	Central Normal College	Virgil Hunt
Evansville	Evansville College	Lincoln B. Hale,
Franklin	Franklin College of Indiana	Wm. Gear Spencer
Goshen	Goshen College	Ernest E. Miller
Greencastle	DePauw University	Clyde E. Wildman
Hanover	Hanover College	A. G. Parker, Jr.
Holy Cross	St. Mary's College, Notre Dame	Sister M. Madeleva
Huntington	Huntington College	Elmer Becker
Indianapolis	Butler University	Daniel Sommer Robinson
Indianapolis	Indiana Central College	I. J. Good
Indianapolis	Indianapolis College of Pharmacy	Edward H. Niles
Indianapolis	Marian College	Mother M. Clarissa
Indianapolis	Normal College of the American Gymnastic Union	W. W. Patty
Lafayette	Purdue University	Edward C. Elliott
Lafayette	St. Francis College	Mother M. Benigna
Marion	Marion College	Wm. F. McConn
Muncie	Ball State Teachers College	L. A. Pittenger
N. Manchester	Manchester College	V. F. Schwalm
Notre Dame	University of Notre Dame	J. Hugh O'Donnell
Oakland City	Oakland City College	W. P. Dearing
Richmond	Earlham College	William C. Dennis
St. Mary-of-the-Woods	St. Mary-of-the-Woods College	Mother Mary Bernard
Terre Haute	Indiana State Teachers College	Ralph N. Tirey
Terre Haute	Rose Polytechnic Institute	Donald B. Prentice
Upland	Taylor University	Robert Lee Stuart
Valparaiso	Valparaiso University	O. P. Kretzmann

Iowa

City	Institution	President
Ames	Iowa State College of Agriculture and Mechanic Arts	Charles E. Friley
Cedar Falls	Iowa State Teachers College	Malcolm Price
Cedar Rapids	Coe College	Charles A. Anderson
Davenport	St. Ambrose College	A. J. Burke
Decorah	Luther College	O. J. H. Preus
Des Moines	Des Moines College of Pharmacy	F. W. Fitch
Des Moines	Des Moines Still College of Osteopathy	A. D. Becker
Des Moines	Drake University	Henry Gadd Harmon
Dubuque	Clarke College	Sister Mary Ambrose Mulholland
Dubuque	Loras College	M. J. Martin
Dubuque	University of Dubuque	Dale D. Welch
Fairfield	Parsons College	Herbert C. Mayer
Fayette	Upper Iowa University	Vivian T. Smith
Grinnell	Grinnell College	Samuel Nowell Stevens
Indianola	Simpson College	
Iowa City	State University of Iowa	Virgil M. Hancher
Le Mars	Western Union College	D. O. Kime
Mount Pleasant	Iowa Wesleyan College	Stanley B. Niles
Mount Vernon	Cornell College	John Benjamin Magee
Oskaloosa	William Penn College	H. E. McGrew
Pella	Central College	Irwin J. Lubbers
Sioux City	Morningside College	Earl A. Roadman
Sioux City	Trinity College	E. M. Leimkuhler
Storm Lake	Buena Vista College	Henry Olson
University Park	John Fletcher College	Charles W. Butler
Waverly	Wartburg College	E. J. Braulick

Kansas

City	Institution	President
Atchison	Mt. St. Scholastica College	Mother Lucy Dooley
Atchison	St. Benedict's College	Martin Veth

City	Institution	President
Baldwin	Baker University	Nelson P. Horn
Emporia	College of Emporia	D. A. Hirschlor
Emporia	Kansas State Teachers College	Thomas W. Butcher
Hays	Fort Hays Kansas State College	L. D. Wooster
Lawrence	University of Kansas	Deane W. Malott
Leavenworth	St. Mary College	Arthur M. Murphy
Lindsborg	Bethany College	Emory Lindquist
McPherson	McPherson College	W. W. Peters
Manhattan	Kansas State College of Agriculture and Applied Science	Francis D. Farrell
North Newton	Bethel College	Ed. G. Kaufman
Ottawa	Ottawa University	Andrew B. Martin
Pittsburg	Kansas State Teachers College	R. H. Hughes
St. Marys	The St. Mary's College	D. H. Conway
Salina	Kansas Wesleyan University	E. K. Morrow
Salina	Marymount College	Mother Mary Chrysostom
Sterling	Sterling College	H. A. Kelsey
Topeka	Washburn Municipal University of Topeka	Arthur G. Sellen, Acting
Wichita	Friends University	W. A. Young
Wichita	Municipal University of Wichita	William M. Jardine
Winfield	Southwestern College	Frank E. Mossman

Kentucky

City	Institution	President
Barbourville	Union College	Conway Boatman
Berea	Berea College	Francis S. Hutchins
Bowling Green	Western Kentucky State Teachers College	Paul L. Garrett
Covington	Villa Madonna College	Michael Leick
Danville	Centre College of Kentucky	Robt. L. McLeod, Jr.
Frankfort	Kentucky State College	R. B. Atwood
Georgetown	Georgetown College	Henry Noble Sherwood
Lexington	Transylvania College	R. F. McLain
Lexington	University of Kentucky	H. L. Donovan
Louisville	Louisville College of Pharmacy	A. P. Markendorf
Louisville	Louisville Municipal College for Negroes, University of Louisville	Raymond A. Kent
Louisville	Nazareth College	Sister Mary Anastasia Coady
Louisville	The Southern Baptist Theological Seminary	John R. Sampey
Louisville	University of Louisville	Raymond A. Kent
Louisville	Ursuline College	Mother M. Roberta
Morehead	Morehead State Teachers College	William H. Vaughan
Murray	Murray State Teachers College	James H. Richmond
Richmond	Eastern Kentucky State Teachers College	W. F. O'Donnell
Wilmore	Asbury College	Z. T. Johnson
Winchester	Kentucky Wesleyan College	Paul Shell Powell

Louisiana

City	Institution	President
Grand Coteau	College of the Sacred Heart	Mother M. Erskine
Hammond	Southeastern Louisiana College	J. Leon Clark
Lafayette	Southwestern Louisiana Institute	Joel L. Fletcher
Natchitoches	Louisiana State Normal College	Joe Farrar
New Orleans	Brescia College	Mother Loretta
New Orleans	Dillard University	A. W. Dent
New Orleans	Loyola University	P. A. Roy
New Orleans	The H. Newcomb Memorial, Tulane University College	Frederick Hard, Dean
New Orleans	St. Mary's Dominican College	Sister Mary Dominic
New Orleans	The Tulane University of Louisiana	Rufus C. Harris
New Orleans	Xavier University	Mother M. Agatha
Pineville	Louisiana College	H. M. Weathersby
Ruston	Louisiana Polytechnic Institute	Claybrook Cottingham
Scotlandville	Southern University and Agricultural and Mechanical College	Felton G. Clark
Shreveport	Centenary College	Pierce Cline
Shreveport	St. Vincent's College	Mother Eugenia
University	Louisiana State University	Campbell B. Hodges

Maine

City	Institution	President
Brunswick	Bowdoin College	Kenneth C. M. Sills
Castine	Eastern State Normal School	William D. Hall
Farmington	State Normal School	Lorey C. Day
Fort Kent	Madawaska Training School	Richard F. Crocker
Gorham	Gorham Normal School	Francis L. Bailey
Lewiston	Bates College	Clifton D. Gray
Machias	Washington State Normal School	Philip H. Kimball
Orono	University of Maine	Arthur A. Hauck
Presque Isle	Aroostook State Normal School	Clifford O. T. Wieden
Springvale	Nasson College	Dawn N. Wallace
Waterville	Colby College	Franklin W. Johnson

Maryland

City	Institution	President
Annapolis	St. John's College	Stringfellow Barr
Baltimore	College of Notre Dame of Maryland	Sister M. Frances
Baltimore	Goucher College	David A. Robertson
Baltimore	Johns Hopkins University	Isaiah Bowman
Baltimore	Loyola College	Edward B. Bunn
Baltimore	Morgan State College	D. O. W. Holmes
Baltimore	St. Mary's Seminary & University	John F. Fenlon
Bowie	State Teachers College	William E. Henry
Chestertown	Washington College	Gilbert W. Mead
College Park	University of Maryland	H. C. Byrd
Emmitsburg	Mount St. Mary's College	John L. Sheridan
Emmitsburg	St. Joseph's College	Sister Paula
Frederick	Hood College	Henry I. Stahr
Frostburg	State Teachers College	John L. Dunkle
Lutherville	Maryland College for Women	William H. Moore
New Windsor	Blue Ridge College	Homer E. Cooper
Salisbury	State Teachers College	J. D. Blackwell
Towson	State Teachers College	M. Theresa Wiedefeld
Westminster	Western Maryland College	F. G. Holloway

Massachusetts

City	Institution	President
Amherst	Amherst College	Stanley King
Amherst	Massachusetts State College	Hugh P. Baker
Boston	Boston University	Daniel L. Marsh
Boston	Calvin Coolidge College	A. Chesley York
Boston	Emmanuel College	Sister Teresa Patricia
Boston	Gordon College of Theology and Missions	Nathan R. Wood
Boston	Massachusetts College of Pharmacy	H. C. Newton, Dean
Boston	Northeastern University	Carl S. Ell
Boston	Simmons College	Bancroft Beatley
Boston	Suffolk University	Gleason L. Archer
Boston	Teachers College of the City of Boston	Wm. H. J. Kennedy
Boston	Wheelock College	Winifred E. Bain
Bridgewater	State Teachers College	John J. Kelly
Cambridge	Harvard University	James B. Conant
Cambridge	Massachusetts Institute of Technology	Karl T. Compton
Cambridge	Radcliffe College	Ada L. Comstock
Chestnut Hill	Boston College	Wm. J. Murphy
Fitchburg	State Teachers College	Charles M. Herlihy
Framingham	State Teachers College	M. F. O'Connor
Hyannis	State Teachers College	Anson B. Handy
Lowell	Lowell Textile Institute	Charles H. Eames
Lowell	State Teachers College	James Dugan
Medford	Tufts College	Leonard Carmichael
Newton Center	Andover Newton Theological School	Everett C. Herrick
North Adams	State Teachers College	Grover C. Bowman
Northampton	Smith College	Herbert J. Davis
Norton	Wheaton College	John Edgar Park
Salem	State Teachers College	Edward A. Sullivan
South Hadley	Mount Holyoke College	Roswell G. Ham
South Lancaster	Atlantic Union College	G. Eric Jones
Springfield	American International College	Chester S. McGown
Springfield	International YMCA College	Ernest M. Best
Waltham	Middlesex University	C. Ruggles Smith
Wellesley	Wellesley College	Mildred H. McAfee
Westfield	State Teachers College	Edw. J. Scanlon
Weston	Regis College	Sister Honora
Williamstown	Williams College	J. P. Baxter, 3rd
Worcester	Assumption College	Rodolphe L. Martel
Worcester	Clark University	Wallace W. Atwood
Worcester	Holy Cross College	Joseph R. N. Maxwell
Worcester	State Teachers College	Clinton E. Carpenter
Worcester	Worcester Polytechnic Institute	Wat Tyler Cluverius

Michigan

City	Institution	President
Adrian	Adrian College	Samuel J. Harrison
Adrian	Siena Heights College	Mother M. Gerald
Albion	Albion College	John L. Seaton
Alma	Alma College	John Wirt Dunning
Ann Arbor	University of Michigan	Alex. G. Ruthven
Berrien Springs	Emmanuel Missionary College	H. J. Klooster
Big Rapids	Ferris Institute	M. S. Ward
Detroit	Detroit College of Law	Ferris D. Stone
Detroit	Detroit Institute of Technology	Paul Hickey
Detroit	Marygrove College	Sister M. Honora
Detroit	Sacred Heart Seminary	Henry E. Donnelly
Detroit	University of Detroit	Charles H. Cloud
Detroit	Wayne University	Frank Cody
East Lansing	Michigan State College of Agriculture and Applied Science	John A. Hannah

City	Institution	President
Grand Rapids	Calvin College	Henry Schultze
Highland Park	Lawrence Institute of Technology	E. George Lawrence
Hillsdale	Hillsdale College	Willfred Mauck
Holland	Hope College	Wynand Wichers
Houghton	Michigan College of Mining and Technology	Grover C. Dillman
Kalamazoo	Kalamazoo College	Paul L. Thompson
Kalamazoo	Western State Teachers College	Paul V. Sangren
Marquette	Northern Michigan College of Education	Henry A. Tape
Marquette	Northern State Teachers College	Webster H. Pearce
Mt. Pleasant	Central Michigan College of Education	Charles L. Anspach
Nazareth	Nazareth College	Sister Mary Kevin
Olivet	Olivet College	Joseph Brewer
Orchard Lake	St. Mary's College	L. J. Krzyzosiak
Ypsilanti	Michigan State Normal College	J. M. Munson

Minnesota

City	Institution	President
Bemidji	State Teachers College	C. R. Sattgast
Collegeville	St. John's University	Alcuin Deutsch
Duluth	College of St. Scholastica	Mother M. Agnes
Duluth	Duluth State Teachers College	Herbert Sorenson
Mankato	State Teachers College	Frank D. McElroy
Minneapolis	Augsburg College and Theological Seminary	Bernhard Christensen
Minneapolis	University of Minnesota	Walter C. Coffey
Moorhead	Concordia College	J. N. Brown
Moorhead	Moorhead State Teachers College	O. W. Snarr
New Ulm	Dr. Martin Luther College	Carl L. Schweppe
Northfield	Carleton College	Donald J. Cowling
Northfield	St. Olaf College	L. W. Boe
St. Cloud	State Teachers College	George A. Selke
St. Joseph	College of St. Benedict	Mother Rosamond Pratschner
St. Paul	Bethel Institute	Henry C. Wingblade
St. Paul	College of St. Catherine	Sister Eucharista
St. Paul	College of St. Thomas	James H. Moynihan
St. Paul	Hamline University	Charles N. Pace
St. Paul	Macalester College	Charles J. Turck
St. Peter	Gustavus Adolphus College	O. J. Johnson
Winona	College of St. Teresa	Sister Mary A. Molloy
Winona	St. Mary's College	Brother Leopold
Winona	Winona State Teachers College	O. Myking Mehus

Mississippi

City	Institution	President
Alcorn	Alcorn Agricultural & Mechanical College	Wm. H. Bell
Blue Mountain	Blue Mountain College	Lawrence T. Lowrey
Cleveland	Delta State Teachers College	W. M. Kethley
Clinton	Mississippi College	D. M. Nelson
Columbus	Mississippi State College for Women	B. L. Parkinson
Hattiesburg	The Mississippi Southern College	J. B. George
Holly Springs	Rust College	L. M. McCoy
Jackson	Belhaven College	G. T. Gillespie
Jackson	Mississippi Negro Training School	Jacob L. Reddix
Jackson	Millsaps College	M. L. Smith
State College	Mississippi State College	G. D. Humphrey
Tougaloo	Tougaloo College	Judson L. Cross
University	University of Mississippi	A. B. Butts

Missouri

City	Institution	President
Canton	Culver Stockton College	W. H. McDonald
Cape Girardeau	Southeast Missouri State Teachers College	Walter W. Parker
Columbia	University of Missouri	F. A. Middlebush
Fayette	Central College	Robert H. Ruff
Fulton	Westminster College	F. L. McCluer
Jefferson City	Lincoln University	Sherman D. Scruggs
Kansas City	College of St. Teresa	Sister Simplicia
Kansas City	Kansas City College of Osteopathy & Surgery	J. M. Peach
Kansas City	Kansas City-Western Dental College	R. J. Rinehart, Dean
Kansas City	Rockhurst College	William H. McCabe
Kansas City	Teachers College of Kansas City	J. C. Bond
Kansas City	University of Kansas City	Clarence R. Decker
Kirksville	Kirksville College of Osteopathy & Surgery	Geo. M. Laughlin
Kirksville	Northeast Missouri State Teachers College	Walter H. Ryle
Liberty	William Jewell College	John F. Herget
Marshall	Missouri Valley College	Thos. Wm. Bibb
Maryville	Northwest Missouri State Teachers College	Uel W. Lamkin
Parkville	Park College	Wm. Lindsay Young
St. Charles	Lindenwood College	H. M. Gage
St. Louis	Concordia Theological Seminary	L. Fuerbringer
St. Louis	Harris Teachers College	W. N. Sellman
St. Louis	Maryville College	Mother M. O. Mouton
St. Louis	St. Louis College of Pharmacy	Robert L. Lund
St. Louis	St. Louis University	H. B. Crimmins
St. Louis	Stowe Teachers College	Ruth Harris
St. Louis	Washington University	George R. Throop, Chancellor
Springfield	Drury College	J. F. Findlay
Springfield	Southwest Missouri State Teachers College	Roy Ellis
Tarkio	Tarkio College	M. Earle Collins
Warrensburg	Central Missouri State Teachers College	G. W. Diemer
Webster Groves	Webster College	George F. Donovan

Montana

City	Institution	President
Billings	Eastern Montana State Normal School	L. B. McMullen
Billings	Billings Polytechnic Institute	Ernest T. Eaton
Bozeman	Montana State College	A. L. Strand
Butte	Montana School of Mines	Francis A. Thomson
Dillon	Montana State Normal College	Sheldon E. Davis
Helena	Carroll College	Emmet J. Riley
Missoula	Montana State University	Ernest O. Melby

Nebraska

City	Institution	President
Blair	Dana College	Lawrence Siersbeck
Central City	Nebraska Central College	O. W. Carrell
Chadron	Nebraska State Teachers College	Wiley G. Brooks
Crete	Doane College	Bryan S. Stoffer
Fremont	Midland College	Fred C. Weigman
Hastings	Hastings College	J. W. Creighton
Kearney	State Teachers College	Herbert L. Cushing
Lincoln	Nebraska Wesleyan University	Benjamin F. Schwartz, Chancellor
Lincoln	Union College	A. H. Rulkoetter
Lincoln	University of Nebraska	C. S. Boucher, Chancellor
Omaha	Creighton University	Joseph P. Zuercher
Omaha	Duchesne College	Mother Helen Casey
Omaha	University of Omaha	Rowland Haynes
Peru	Nebraska State Teachers College	W. R. Pate
Seward	Concordia Teachers College	A. O. Fuerbringer
Wayne	Nebraska State Teachers College	J. T. Anderson
York	York College	D. E. Weidler

Nevada

City	Institution	President
Reno	University of Nevada	Leon W. Hartman

New Hampshire

City	Institution	President
Durham	University of New Hampshire	Fred Engelhardt
Hanover	Dartmouth College	Ernest M. Hopkins
Hudson	Rivier College	Sister Marie Madeleine
Keene	Keene Teachers College	Lloyd P. Young
Manchester	St. Anselm's College	Bertrand C. Dolan
Plymouth	Plymouth Teachers College	Ernest L. Silver

New Jersey

City	Institution	President
Convent Station	College of St. Elizabeth	Sister Marie Jose
East Orange	Panzer College of Physical Education and Hygiene	Margaret C. Brown
East Orange	Upsala College	Evald B. Lawson
Glassboro	New Jersey State Teachers College	Edgar F. Bunce
Hoboken	Stevens Institute of Technology	Harvey N. Davis
Jersey City	State Teachers College at Jersey City	Chris C. Rossey
Jersey City	St. Peter's College	Dennis J. Comey
Lakewood	Georgian Court College	Mother Mary John
Madison	Drew University	Arlo Ayres Brown
Montclair	New Jersey State Teachers College	Harry A. Sprague
Newark	Newark College of Engineering	Allan R. Cullimore
Newark	New Jersey State Teachers College	Roy L. Shaffer
Newark	University of Newark	George H. Black
New Brunswick	Rutgers University	Robert C. Clothier
Paterson	New Jersey State Teachers College	C. S. Wightman
Princeton	Princeton Theological Seminary	John A. Mackay
Princeton	Princeton University	Harold W. Dodds
Princeton	St. Joseph's College	Arthur DeC. Hamilton
South Orange	Seton Hall College	James F. Kelley
Trenton	State Teachers College	Roscoe L. West
Zarephath	Alma White College	Arthur K. White

New Mexico

City	Institution	President
Albuquerque	University of New Mexico	J. F. Zimmerman
El Rito	Spanish-American Normal School	Joseph B. Grant
Las Vegas	New Mexico Highlands University	Edward Eyring
Silver City	New Mexico State Teachers College	H. W. James
Socorro	New Mexico School of Mines	C. E. Needham
State College	New Mexico State College of Agriculture & Mechanic Arts	Hugh M. Milton II

New York

City	Institution	President
Albany	College of St. Rose	Edmund F. Gibbons
Albany	New York State College for Teachers	John M. Sayles
Alfred	Alfred University	John Nelson Norwood
Annandale-on-Hudson	Bard College, Columbia University	Charles Harold Gray, Dean
Aurora	Wells College	William E. Weld
Brockport	State Normal School	E. C. Hartwell
Bronxville	Sarah Lawrence College	Constance Warren
Brooklyn	Brooklyn College	Harry D. Gideonse
Brooklyn	Long Island University	Tristram W. Metcalfe, Dean
Brooklyn	Polytechnic Institute of Brooklyn	Harry S. Rogers
Brooklyn	Saint Francis College	Brother Columba
Brooklyn	St. John's University	Edward J. Walsh
Brooklyn	St. Joseph's College for Women	Thomas E. Molloy
Buffalo	Canisius College	Timothy J. Coughlin
Buffalo	D'Youville College	Sister Grace of the Sacred Heart
Buffalo	Mount St. Joseph Teachers College	Sister M. Theodosia
Buffalo	State Teachers College	Harry W. Rockwell
Buffalo	University of Buffalo	Samuel Paul Capen, Chancellor
Canton	St. Lawrence University	Millard H. Jencks
Clinton	Hamilton College	W. H. Cowley
Cortland	Cortland Normal School	H. DeW. DeGroat
Elmira	Elmira College	W. S. A. Pott
Flushing	Queens College	Paul Klapper
Fredonia	State Normal School	L. R. Gregory
Garden City	Adelphi College	Paul Dawson Eddy
Geneseo	State Normal School	James B. Welles
Geneva	Hobart College	William A. Eddy
Hamilton	Colgate University	George B. Cutten
Hempstead	Hofstra College	T. P. Calkins
Houghton	Houghton College	Stephen W. Paine
Ithaca	Cornell University	Edmund Ezra Day
Ithaca	Ithaca College	Leonard Bliss Job
Keuka Park	Keuka College	Henry E. Allen
New Paltz	State Normal School	L. H. van den Berg
New Rochelle	College of New Rochelle	Francis W. Walsh
New York	Barnard College	Virginia C. Gildersleeve, Dean
New York	Biblical Seminary in New York	Horace Ford Martin
New York	Child Education Foundation	Anna Eva McLin
New York	College of the City of New York	Harry N. Wright, Acting
New York	College of Mount St. Vincent	Sister Catherine Marie, Dean
New York	Columbia University	Nicholas Murray Butler
New York	Cooper Union	Gano Dunn
New York	Fordham University	Robert I. Gannon
New York	General Theological Seminary	H. E. W. Fosbroke, Dean
New York	Hunter College of the City of N.Y.	George Nauman Shuster
New York	Jewish Theological Seminary of America	Louis Finkelstein
New York	Manhattan College	Brother A. Victor
New York	Manhattanville College of The Sacred Heart	Mother Grace C. Dammann
New York	New York Medical College	J. A. W. Hetrick, Acting
New York	New York University	Harry W. Chase, Chancellor
New York	Savage School for Physical Education	Ella W. Savage
New York	Teachers College, Columbia University	Wm. F. Russell, Dean
New York	Union Theological Seminary	Henry S. Coffin
New York	Yeshiva College	
Niagara University	Niagara University	Joseph M. Noonan
Oneonta	Hartwick College	Henry J. Arnold
Oneonta	State Normal School	Chas. W. Hunt
Oswego	State Normal School	Ralph W. Swetman
Plattsburg	State Normal School	Charles C. Ward
Potsdam	Clarkson College	John A. Ross, Jr.
Potsdam	State Normal School	Clarence O. Lehman
Poughkeepsie	Vassar College	Henry Noble MacCracken
Rochester	Nazareth College of Rochester	Mother Rose Miriam
Rochester	The Colgate-Rochester Divinity School	Albert W. Beaven
Rochester	University of Rochester	Alan Valentine
St. Bonaventure	St. Bonaventure College	Thomas Plassmann
Saratoga Springs	Skidmore College	Henry T. Moore
Schenectady	Union College	Dixon Ryan Fox
Staten Island	Wagner Memorial Lutheran College	Clarence C. Stoughton
Syracuse	New York State College of Forestry	Samuel N. Spring, Dean
Syracuse	City Normal School	Wm. W. Wright
Syracuse	Syracuse University	W. P. Graham, Chancellor
Tarrytown	Marymount College	Mother M. Gerard
Troy	Rensselaer Polytechnic Institute	Wm. O. Hotchkiss
Troy	Russell Sage College	J. L. Meader
West Point	United States Military Academy	R. L. Eichelberger
White Plains	Good Counsel College	Mother M. Aloysia

North Carolina

City	Institution	President
Asheville	Asheville Normal & Teachers College	Frank Foster
Boone	Appalachian State Teachers College	B. B. Dougherty
Chapel Hill	University of North Carolina	Frank P. Graham
Charlotte	Johnson C. Smith University	H. L. McCrorey
Charlotte	Queens College	Hunter B. Blakely
Cullowhee	Western Carolina Teachers College	H. T. Hunter
Davidson	Davidson College	John Rood Cunningham
Durham	Duke University	Robert Lee Flowers
Durham	North Carolina College for Negroes	James E. Shepard
Elizabeth City	Elizabeth City State Teachers College	Harold L. Trigg
Elon College	Elon College	Leon E. Smith
Fayetteville	Fayetteville State Teachers College	J. W. Seabrook
Greensboro	Agricultural & Technical College	F. D. Bluford
Greensboro	Bennett College	David D. Jones
Greensboro	Greensboro College	Luther L. Gobbel
Greensboro	Woman's College of the University of North Carolina	Frank P. Graham
Greenville	East Carolina Teachers College	Leon R. Meadows
Guilford College	Guilford College	Clyde A. Milner
Hickory	Lenoir Rhyne College	P. E. Monroe
High Point	High Point College	G. I. Humphreys
Pembroke	Pembroke State College for Indians	Owens Hand Browne
Raleigh	Meredith College	Carlyle Campbell
Raleigh	North Carolina State College of Agriculture & Engineering, University of North Carolina	John W. Harrelson, Dean
Raleigh	St. Augustine's College	Edgar H. Goold
Raleigh	Shaw University	Robert P. Daniel
Red Springs	Flora MacDonald College	Henry G. Bedinger
Salisbury	Catawba College	Howard R. Omwake
Salisbury	Livingstone College	W. J. Trent
Wake Forest	Wake Forest College	Thurman D. Kitchin
Wilson	Atlantic Christian College	H. S. Hilley
Winston-Salem	Salem College	H. E. Rondthaler
Winston-Salem	Winston-Salem Teachers College	F. L. Atkins

North Dakota

City	Institution	President
Dickinson	State Teachers College	C. E. Scott
Ellendale	State Normal & Industrial School	J. C. McMillan
Fargo	North Dakota Agricultural College	Frank L. Eversull
Grand Forks	University of North Dakota	John C. West
Grand Forks	Wesley College	T. Ross Hicks
Jamestown	Jamestown College	B. H. Kroeze
Minot	State Teachers College	Carl C. Swain
Valley City	State Teachers College	James E. Cox

Ohio

City	Institution	President
Ada	Ohio Northern University	Robert Williams
Akron	University of Akron	H. E. Simmons
Alliance	Mount Union College	Charles Burgess Ketcham
Ashland	Ashland College	Edward G. Mason
Athens	Ohio University	Herman G. James
Berea	Baldwin-Wallace College	Louis Clinton Wright
Bluffton	Bluffton College	Lloyd L. Ramseyer
Bowling Green	Bowling Green State University	F. J. Prout

City	Institution	President
Cedarville	Cedarville College	Walter S. Kilpatrick
Cincinnati	Teachers College, Athenaeum of Ohio	Carl J. Ryan, Dean
Cincinnati	University of Cincinnati	Raymond Walters
Cincinnati	Xavier University	Celestin J. Steiner
Cleveland	John Carroll University	Edmund C. Horne
Cleveland	Case School of Applied Science	Wm. E. Wickenden
Cleveland	Fenn College	C. V. Thomas
Cleveland	Ursuline College for Women	Mother Marie Sands
Cleveland	Western Reserve University	W. G. Leutner
Columbus	Capital University	Otto Mees
Columbus	The Ohio State University	Howard L. Bevis
Columbus	St. Mary of the Springs College	Sister M. Aloyse
Dayton	University of Dayton	John A. Elbert
Defiance	Defiance College	John W. Claxton
Delaware	Ohio Wesleyan University	Herbert J. Burgstahler
Findlay	Findlay College	H. R. Dunathan
Gambier	Kenyon College	Gordon K. Chalmers
Granville	Denison University	Kenneth Irving Brown
Hiram	Hiram College	Paul H. Fall
Kent	Kent State University	K. C. Leebrick
Manchester	Alfred Holbrook College	Norborne H. Crowell
Marietta	Marietta College	Harry K. Eversull
Mount St. Joseph	College of Mount St. Joseph	Mother Mary Regina
New Concord	Muskingum College	R. N. Montgomery
Oberlin	Oberlin College	Ernest H. Wilkins
Oxford	Miami University	A. H. Upham
Oxford	Western College	Mrs. Alexander Thompson
Painesville	Lake Erie College	Helen D. Bragdon
South Euclid	Notre Dame College	Mother Mary Evarista
Springfield	Wittenberg College	Rees Edgar Tulloss
Tiffin	Heidelberg College	Clarence E. Josephson
Toledo	Mary Manse College	Mother Vincent de Paul Kaley
Toledo	De Sales College	Raymond G. Kirsch
Toledo	University of Toledo	Philip Curtis Nash
Westerville	Otterbein College	J. Ruskin Howe
Wilberforce	Wilberforce University	R. R. Wright, Jr.
Wilmington	Wilmington College	S. Arthur Watson
Wooster	The College of Wooster	Charles F. Wishart
Yellow Springs	Antioch College	A. D. Henderson
Youngstown	Youngstown College	Howard W. Jones

Oklahoma

City	Institution	President
Ada	East Central State Teachers College	A. Linscheid
Alva	Northwestern State College	Charles O. Newlun
Bethany	Bethany-Peniel College	A. K. Bracken
Chickasha	Oklahoma College for Women	M. A. Nash
Durant	Southeastern State Teachers College	T. T. Montgomery
Edmond	Central State College	R. R. Robinson
Enid	Phillips University	Eugene S. Briggs
Goodwell	Panhandle Agricultural & Mechanical College	Edward L. Morrison
Guthrie	Catholic College	Mother Mary Agnes
Langston	Langston University	G. L. Harrison
Norman	University of Oklahoma	Joseph A. Brandt
Oklahoma City	Oklahoma City University	C. Q. Smith
Shawnee	Oklahoma Baptist University	John W. Raley
Stillwater	Oklahoma Agricultural & Mechanical College	Henry G. Bennett
Tahlequah	Northeastern State Teachers College	John Vaughan
Tulsa	University of Tulsa	C. I. Pontius
Weatherford	Southwestern Institute of Technology	James B. Boren

Oregon

City	Institution	President
Ashland	Southern Oregon College of Education	Walter Redford
Corvallis	Oregon State College	F. A. Gilfillan, Acting
Eugene	University of Oregon	Donald Milton Erb
Forest Grove	Pacific University	Walter C. Giersbach
La Grande	Eastern Oregon College	Roben J. Maaske
Marylhurst	Marylhurst College	Sister Miriam Anna
McMinnville	Linfield College	William Graham Everson
Monmouth	Oregon College of Education	Charles A. Howard
Newberg	Pacific College	Emmett Gulley
Portland	Albany College	B. A. Thaxter, Acting
Portland	North Pacific College of Oregon	Herbert C. Miller
Portland	Reed College	Dexter M. Keezer
Portland	University of Portland	Charles C. Miltner
Salem	Willamette University	Carl Sumner Knopf

Pennsylvania

City	Institution	President
Allentown	Cedar Crest College	
Allentown	Muhlenberg College	Levering Tyson
Annville	Lebanon Valley College	Clyde A. Lynch
Beaver Falls	Geneva College	M. M. Pearce
Bethlehem	Lehigh University	Clement C. Williams
Bethlehem	Moravian College and Theological Seminary	W. N. Schwarze
Bethlehem	Moravian Seminary and College for Women	Edwin J. Heath
Bloomsburg	State Teachers College	Harvey A. Andruss
Bryn Athyn	Academy of the New Church	George de Charms
Bryn Mawr	Bryn Mawr College	Marion E. Park
California	California State Teachers College	Robert M. Steele
Carlisle	Dickinson College	Fred P. Corson
Chambersburg	Wilson College	Paul S. Havens
Chester	Crozer Theological Seminary	James H. Franklin
Chester	Pennsylvania Military College	Frank K. Hyatt
Chestnut Hill	College of Chestnut Hill	Sister Maria Kostka
Cheyney	State Teachers College	L. P. Hill
Clarion	State Teachers College	Paul G. Chandler
Collegeville	Ursinus College	N. E. McClure
Dallas	College Misericordia	Sister Mary Pierre
Easton	Lafayette College	Wm. Mather Lewis
East Stroudsburg	State Teachers College	Joseph F. Noonan
Edinboro	State Teachers College	L. H. Van Houten
Elizabethtown	Elizabethtown College	A. C. Baugher
Erie	Mercyhurst College	Sister M. de Sales Preston
Erie	Villa Maria College	Joseph J. Wehrle
Gettysburg	Gettysburg College	H. W. A. Hanson
Greensburg	Seton Hill College	J. A. W. Reeves
Greenville	Thiel College	George H. Rowley, Acting
Grove City	Grove City College	Weir C. Ketler
Haverford	Haverford College	Felix Morley
Huntingdon	Juniata College	Charles C. Ellis
Immaculata	Immaculata College	Francis J. Furey
Indiana	Indiana State Teachers College	Le Roy A. King
Jenkintown	Beaver College	Raymon Kistler
Kutztown	State Teachers College	Quincy A. W. Rohrbach
Lancaster	Franklin & Marshall College	T. A. Distler
Latrobe	St. Vincent College	Alfred Koch
Lewisburg	Bucknell University	Arnaud C. Marts
Lincoln Univ.	Lincoln University	Walter L. Wright
Lock Haven	State Teachers College	John G. Flowers
Loretto	St. Francis College	John P. J. Sullivan
Mansfield	State Teachers College	Willis E. Pratt
Meadville	Allegheny College	Wm. P. Tolley
Millersville	State Teachers College	Landis Tanger
New Wilmington	Westminster College	Robert F. Galbreath
Philadelphia	Drexel Institute of Technology	Parke R. Kolbe
Philadelphia	Dropsie College for Hebrew and Cognate Learning	Abraham A. Neuman
Philadelphia	Hahnemann Medical College	Joseph S. Conwell
Philadelphia	Jefferson Medical College	William Harvey Perkins
Philadelphia	La Salle College	Brother Emilian
Philadelphia	Philadelphia College of Osteopathy	Edgar O. Holden, Dean
Philadelphia	Philadelphia College of Pharmacy & Science	Ivor Griffith
Philadelphia	St. Joseph's College	Thomas J. Love
Philadelphia	Temple University	Robert Livingston Johnson
Philadelphia	University of Pennsylvania	Thomas S. Gates
Philadelphia	Women's Medical College of Pennsylvania	Ellen C. Potter, Acting
Pittsburgh	Carnegie Institute of Technology	R. E. Doherty
Pittsburgh	Duquesne University	Raymond V. Kirk
Pittsburgh	Mount Mercy College	Mother M. Irenaeus Dougherty
Pittsburgh	Pennsylvania College for Women	Herbert L. Spencer
Pittsburgh	University of Pittsburgh	John G. Bowman, Chancellor
Reading	Albright College	Harry V. Masters
Rosemont	Rosemont College	Mother Mary Cleophas
Scranton	Marywood College	Mother M. Marcella
Scranton	University of Scranton	Brother E. Leonard
Selinsgrove	Susquehanna University	G. Morris Smith
Shippensburg	State Teachers College	A. L. Rowland
Slippery Rock	State Teachers College	John A. Entz
State College	Pennsylvania State College	Ralph D. Hetzel
Swarthmore	Swarthmore College	John W. Nason
Villanova	Villanova College	E. V. Stanford
Washington	Washington & Jefferson College	Ralph Cooper Hutchison
Waynesburg	Waynesburg College	Paul R. Stewart
West Chester	State Teachers College	Charles S. Swope

Rhode Island

City	Institution	President
Kingston	Rhode Island State College	Carl Raymond Woodward
Providence	Brown University	Henry M. Wriston
Providence	Providence College	John J. Dillon
Providence	Rhode Island College of Education	Lucius A. Whipple
Providence	Rhode Island College of Pharmacy and Allied Sciences	A. W. Claflin

South Carolina

City	Institution	President
Charleston	The Citadel	Chas. P. Summerall
Charleston	College of Charleston	Harrison Randolph
Charleston	Medical College of the State of South Carolina	Robert Wilson
Clemson	The Clemson Agricultural College	Robert Franklin Poole
Clinton	Presbyterian College	William P. Jacobs
Columbia	Allen University	S. R. Higgins
Columbia	Benedict College	J. J. Starks
Columbia	Columbia College	J. Caldwell Guilds
Columbia	University of South Carolina	J. R. McKissick
Due West	Erskine College	Robert C. Grier
Gaffney	Limestone College	R. C. Granberry
Greenville	Furman University	J. L. Plyler
Greenwood	Lander College	John Marvin Rast
Hartsville	Coker College	C. Sylvester Green
Newberry	Newberry College	James C. Kinard
Orangeburg	Claflin College	J. B. Randolph
Orangeburg	State Agricultural and Mechanical College	M. F. Whittaker
Rock Hill	Winthrop College	Shelton Phelps
Spartanburg	Converse College	Edward M. Gwathmay
Spartanburg	Wofford College	Henry N. Snyder
Sumter	Morris College	J. P. Garrick

South Dakota

City	Institution	President
Aberdeen	Northern State Teachers College	N. E. Steele
Brookings	South Dakota State College of Agriculture & Mechanic Arts	Lyman E. Jackson
Huron	Huron College	Geo. F. McDougall
Madison	Eastern State Normal School	V. A. Lowry
Mitchell	Dakota Wesleyan University	Joseph H. Edge
Rapid City	South Dakota State School of Mines	Joseph P. Connolly
Sioux Falls	Augustana College	Clemens M. Granskou
Sioux Falls	Sioux Falls College	Barrett Lowe
Spearfish	Black Hills Teachers College	E. C. Woodburn
Springfield	Southern State Normal School	W. A. Thompson
Vermillion	University of South Dakota	I. D. Weeks
Yankton	Yankton College	J. L. McCorison, Jr.

Tennessee

City	Institution	President
Bristol	King College	Thomas P. Johnston
Chattanooga	University of Chattanooga	Archie M. Palmer
Clarksville	Austin Peay Normal School	P. P. Claxton
Cleveland	Bob Jones College	Bob Jones
Cookeville	Tennessee Polytechnic Institute	Everett Derryberry
Greeneville	Tusculum College	
Harrogate	Lincoln Memorial University	S. W. McClelland
Jackson	Lambuth College	Richard E. Womack
Jackson	Lane College	J. F. Lane
Jackson	Union University	John J. Hurt
Jefferson City	Carson-Newman College	James T. Warren
Johnson City	State Teachers College	C. C. Sherrod
Knoxville	Knoxville College	J. A. Cotton
Knoxville	The University of Tennessee	James D. Hoskins
Lebanon	Cumberland University	Ernest L. Stockton
Madison College	Madison College	E. A. Sutherland
Maryville	Maryville College	Ralph Waldo Lloyd
McKenzie	Bethel College	E. K. Reagin
Memphis	Southwestern	Charles E. Diehl
Memphis	State College	Richard C. Jones
Milligan College	Milligan College	C. E. Burns
Murfreesboro	State Teachers College	Q. M. Smith
Murfreesboro	Tennessee College	Merrill D. Moore
Nashville	Fisk University	Thomas E. Jones
Nashville	George Peabody College	S. C. Garrison
Nashville	Scarritt College	Jesse Lee Cuninggim
Nashville	Tennessee Agricultural & Industrial State College	W. J. Hale
Nashville	Vanderbilt University	O. C. Carmichael
Sewanee	University of the South	Alexander Guerry

Texas

City	Institution	President
Abilene	Abilene Christian College	Don H. Morris
Abilene	Hardin-Simmons University	W. R. White
Abilene	McMurry College	Frank L. Turner
Alpine	Sul Ross State Teachers College	H. W. Morelock
Austin	Samuel Huston College	Stanley E. Grannum
Austin	St. Edward's University	S. F. Lisewski
Austin	Tillotson College	Mary E. Branch
Austin	The University of Texas	Homer P. Rainey
Belton	Mary Hardin-Baylor College	Gordon G. Singleton
Brownwood	Daniel Baker College	T. H. Hart
Brownwood	Howard Payne College	Thomas H. Taylor
Canyon	West Texas State Teachers College	J. A. Hill
College Station	Agricultural & Mechanical College of Texas	T. O. Walton
Commerce	East Texas State Teachers College	Sam H. Whitley
Dallas	Southern Methodist University	Umphrey Lee
Denton	North Texas State Teachers College	W. J. McConnell
Denton	Texas State College for Women	Louis H. Hubbard
El Paso	Texas College of Mines and Metallurgy	D. M. Wiggins
Fort Worth	Texas Christian University	M. E. Sadler
Fort Worth	Texas Wesleyan College	Law Sone
Georgetown	Southwestern University	J. W. Bergin
Houston	The Rice Institute	Edgar Odell Lovett
Huntsville	Sam Houston State Teachers College	C. N. Shaver
Jacksonville	Jacksonville College	Claude R. Meadows
Kingsville	Texas College of Arts & Industries	J. L. Nierman
Lubbock	Texas Technological College	Clifford B. Jones
Marshall	Bishop College	Joseph J. Rhoads
Marshall	Wiley College	M. W. Dogan
Nacogdoches	Stephen F. Austin State Teachers College	A. W. Birdwell
Prairie View	Prairie View State College	W. R. Banks
San Antonio	Incarnate Word College	Sister M. Columkille
San Antonio	Our Lady of the Lake College	J. L. McMahon
San Antonio	St. Mary's University	Walter F. Golatka
San Antonio	University of San Antonio	W. W. Jackson
San Marcos	Southwest Texas State Teachers College	C. E. Evans
Sherman	Austin College	Everett B. Tucker
Tyler	Texas College	D. R. Glass
Waco	Baylor University	Pat N. Neff
Waxahachie	Trinity University	F. L. Wear

Utah

City	Institution	President
Logan	Utah State Agricultural College	Elmer G. Peterson
Provo	Brigham Young University	Franklin S. Harris
Salt Lake City	College of St. Mary-of-the-Wasatch	Sister Mary Agnes
Salt Lake City	University of Utah	LeRoy E. Cowles

Vermont

City	Institution	President
Bennington	Bennington College	Lewis Webster Jones
Burlington	Trinity College	Sister Mary Emmanuel
Burlington	University of Vermont and State Agricultural College	Paul C. Packer, Acting
Castleton	State Normal School	Ermo Houston Scott
Johnson	State Normal School	Donald W. McClelland
Middlebury	Middlebury College	Paul D. Moody
Northfield	Norwich University	John M. Thomas
Winooski Park	St. Michael's College	James H. Petty

Virginia

City	Institution	President
Alexandria	Virginia Theological Seminary	A. C. Zabriskie, Dean
Ashland	Randolph-Macon College	J. Earl Moreland
Blacksburg	Virginia Polytechnic Institute	Julian A. Burruss
Bridgewater	Bridgewater College	Paul H. Bowman
Charlottesville	University of Virginia	John Lloyd Newcomb
Emory	Emory & Henry College	J. N. Hillman
Farmville	State Teachers College	J. L. Jarman
Fredericksburg	Mary Washington College	Morgan L. Combs
Hampden-Sydney	Hampden-Sydney College	Edgar G. Gammon
Hampton	Hampton Institute	Malcolm S. Maclean
Harrisonburg	Madison College	S. P. Duke
Hollins College	Hollins College	Bessie C. Randolph
Lawrenceville	St. Paul Normal and Industrial School	J. A. Russell
Lexington	Virginia Military Institute	Chas. E. Kilbourne, Supt.
Lexington	Washington & Lee University	Francis P. Gaines
Lynchburg	Lynchburg College	R. B. Montgomery
Lynchburg	Randolph-Macon Woman's College	Theo. Henley Jack

City	Institution	President
Lynchburg	Virginia Theological Seminary and College	W. H. R. Powell
Petersburg	Virginia State College for Negroes	John M. Gandy
Radford	State Teachers College at Radford	David W. Peters
Richmond	Medical College of Virginia	William T. Sanger
Richmond	University of Richmond	F. W. Boatwright
Richmond	Virginia Union University	J. M. Ellison
Salem	Roanoke College	Chas. J. Smith
Staunton	Mary Baldwin College	L. Wilson Jarman
Sweet Briar	Sweet Briar College	
Williamsburg	College of William & Mary	John Stewart Bryan

Washington

City	Institution	President
Bellingham	Western Washington College of Education	W. W. Haggard
Cheney	Eastern Washington College of Education	Ralph E. Tieje
College Place	Walla Walla College	George W. Bowers
Ellensburg	Central Washington College of Education	Rob't E. McConnell
Lacey	St. Martin's College	Lambert Burton
Pullman	State College of Washington	Ernest O. Holland
Seattle	Seattle Pacific College	Charles H. Watson
Seattle	University of Washington	Lee Paul Sieg
Spokane	Gonzaga University	Leo J. Robinson
Spokane	Holy Names College	Sister M. Elizabeth Clare
Spokane	Whitworth College	Frank F. Warren
Tacoma	College of Puget Sound	Edward H. Todd
Walla Walla	Whitman College	Walter A. Bratton

West Virginia

City	Institution	President
Athens	Concord State Teachers College	J. Frank Marsh
Bethany	Bethany College	W. H. Cramblet
Bluefield	Bluefield State Teachers College	Henry Lake Dickason
Buckhannon	West Virginia Wesleyan College	Wallace B. Fleming
Charleston	Morris Harvey College	Leonard Riggleman
Elkins	Davis & Elkins College	R. T. L. Liston
Fairmont	Fairmont State Teachers College	John W. Pence
Glenville	Glenville State Teachers College	E. G. Rohrbough
Harpers Ferry	Storer College	H. T. McDonald
Huntington	Marshall College	James E. Allen
Institute	West Virginia State College	John W. Davis
Montgomery	West Virginia Institute of Technology	E. S. Maclin
Morgantown	West Virginia University	Charles E. Lawall
Philippi	Alderson-Broaddus College	John Wesley Elliott
Salem	Salem College	S. Orestes Bond
Shepherdstown	Shepherd State Teachers College	W. H. S. White
West Liberty	West Liberty State Teachers College	Paul N. Elbin

Wisconsin

City	Institution	President
Appleton	Lawrence College	Thomas N. Barrows
Ashland	Northland College	J. D. Brownell
Beloit	Beloit College	
Eau Claire	State Teachers College	W. R. Davies
La Crosse	State Teachers College	Rexford S. Mitchell
La Crosse	Viterbo College	Mother M. Engelberta
Madison	Edgewood Teachers College of the Sacred Heart	Sister Rose Catherine
Madison	University of Wisconsin	Clarence A. Dykstra
Menomonie	The Stout Institute	Burton E. Nelson
Milton	Milton College	J. G. Meyer
Milwaukee	Alverno Teachers College	Mother M. Stanislaus
Milwaukee	Marquette University	Raphael C. McCarthy
Milwaukee	Milwaukee-Downer College	Lucia R. Briggs
Milwaukee	Mount Mary College	Edw. A. Fitzpatrick
Milwaukee	State Teachers College	Frank E. Baker
Nashotah	Nashotah House	E. J. M. Nutter
Oshkosh	State Teachers College	Forrest R. Polk
Platteville	State Teachers College	Asa M. Royce
Plymouth	Mission House College	Paul Grosshuesch
Ripon	Ripon College	Silas Evans
River Falls	State Teachers College	J. H. Ames
Stevens Point	State Teachers College	Wm. C. Hausen
Superior	State Teachers College	C. W. Smith, Acting
Watertown	Northwestern College	Erwin E. Kowalke
Waukesha	Carroll College	G. T. Vander Lugt
West De Pere	St. Norbert College	B. H. Pennings
Whitewater	State Teachers College	C. M. Yoder

Wyoming

City	Institution	President
Laramie	University of Wyoming	James Lewis Morrill

Possessions

City	Institution	President
College, Alaska	University of Alaska	Charles E. Bunnell
Honolulu, Hawaii	University of Hawaii	David L. Crawford
Dumaguete, Philippine Islands	Silliman University	Arthur L. Carson
Manila, Philippine Islands	De La Salle College	Brother Xavier
Manila, Philippine Islands	Mapua Institute of Technology	Tomas Mapua
Manila, Philippine Islands	Philippine Normal School	R. K. Gilmore, Supt.
Manila, Philippine Islands	University of the Philippines	B. M. Gonzalez
Rio Piedras, Puerto Rico	University of Puerto Rico	Rafael Menendez Ramos
San German	Polytechnic Institute of Puerto Rico	Jarvis S. Morris

Canada

City	Institution	President
Antigonish, N. S.	St. Francis Xavier University	D. J. MacDonald
Charlottetown, P. E. I.	St. Dunstan's College	J. A. Murphy
Edmonton, Alta.	University of Alberta	Robert Newton, Acting
Fredericton, N. B.	University of New Brunswick	Norman A. M. MacKenzie
Halifax, N. S.	Dalhousie University	Carleton Stanley
Halifax, N. S.	Halifax Ladies College	E. Florence Blackwood
Halifax, N. S.	University of King's College	A. Stanley Walker
Hamilton, Ont.	McMaster University	G. P. Gilmour
Kingston, Ont.	Queen's University	R. C. Wallace
Lennoxville, Que.	Bishop's University	A. H. McGreer
London, Ont.	University of Western Ontario	Wm. Sherwood Fox
Montreal, Que.	Loyola College	E. M. Brown
Montreal, Que.	McGill University	Frank Cyril James
Montreal, Que.	Université de Montréal	Arthur Vallee
Ottowa, Ont.	University of Ottawa	G. Marchand
Ottawa, Ont.	University of Ottawa Normal School	René Lamoureux
Quebec, Que.	Laval University	Camille Roy
Quebec, Que.	Ursuline College	Mother St. Clotilde
St. Joseph, N. B.	St. Joseph's University	L. LaPalme
Saskatoon, Sask.	University of Saskatchewan	James S. Thomson
Toronto, Ont.	University of Toronto	H. J. Cody
Toronto, Ont.	Upper Canada College	T. W. L. MacDermot
Toronto, Ont.	Victoria University	Walter T. Brown
Truro, N. S.	Nova Scotia Agricultural College	C. Eric Boulden
Vancouver, B. C.	University of British Columbia	Leonard S. Klinck
Winnipeg, Man.	University of Manitoba	Sidney E. Smith
Winnipeg, Man.	United College	W. C. Graham
Wolfville, N. S.	Acadia University	F. W. Patterson

SECTION XIII
PRESIDENTS OF JUNIOR COLLEGES

Alabama

City	Institution	President
Boaz	Snead Junior College	Joseph Warren Broyles
Huntsville	Oakwood Junior College	J. L. Moran
Jasper	Walker Junior College	C. A. Jesse
Marion	Marion Institute	Walter L. Murfee
Normal	State Agricultural and Mechanical Institute	J. F. Drake
St. Bernard	St. Bernard College	Boniface Seng
Tuscaloosa	Stillman Institute	A. L. Jackson
Wadley	Southern Union College	Ross E. Ensminger

Arizona

City	Institution	President
Phoenix	Phoenix Junior College	E. W. Montgomery
Thatcher	Gila Junior College	Monroe H. Clarke

Arkansas

City	Institution	President
Beebe	Junior Agricultural College of Central Arkansas	B. E. Whitmore
Conway	Central College	O. J. Wade
El Dorado	El Dorado Junior College	J. I. McClurkin
Fort Smith	Fort Smith Junior College	J. W. Ramsey
Little Rock	Dunbar Junior College	John H. Lewis
Little Rock	Little Rock Junior College	J. A. Larson
Magnolia	Agricultural & Mechanical College	C. A. Overstreet
Russellville	Arkansas Polytechnic College	J. W. Hull

California

City	Institution	President
Arlington	La Sierra College	E. E. Cossentine
Auburn	Placer Junior College	Ernest E. Oertel, Dean
Azusa	Citrus Junior College	F. S. Hayden
Bakersfield	Bakersfield Junior College	Grace V. Bird
Belmont	College of Notre Dame	Sister Helen Bernardine
Berkeley	Armstrong College	J. Evan Armstrong
Berkeley	Williams Junior College	J. W. Hopkins
Brawley	Brawley Junior College	Percy E. Palmer, Principal
Coalinga	Coalinga Junior College	T. A. Ellestad
Compton	Compton Junior College	O. Scott Thompson
Deep Springs	Deep Springs Junior College	Armand W. Kelly, Director
El Centro	Central Junior College	Guy A. Weakley, Principal
Fullerton	Fullerton Junior College	Frederick T. Chamberlin
Glendale	Glendale Junior College	George H. Geyer, Director
Hollister	San Benito County Junior College	James P. Davis, Principal
Kentfield	Marin Junior College	A. C. Olney
Lancaster	Antelope Valley Junior College	David J. Roach
Long Beach	Long Beach Junior College	John L. Lounsbury
Los Angeles	Holmby College	Frederica de Laguna
Los Angeles	Los Angeles City College	Rosco C. Ingalls
Los Angeles	Los Angeles Pacific College	C. Dorr Demeray
Marysville	Yuba Junior College	Pedro Osuna
Menlo Park	Menlo School and Junior College	Lowry S. Howard
Modesto	Modesto Evening Junior College	W. M. Pugh
Modesto	Modesto Junior College	Dwight C. Baker
Oakland	California Concordia College	Theodore Brohm
Oceanside	Oceanside-Carlsbad Junior College	Ralph I. Hale, Supt. of Schools
Ontario	Chaffey Junior College	Gardiner W. Spring
Pasadena	Pasadena Junior College	John W. Harbeson
Pomona	Pomona Junior College	J. E. Walker
Porterville	Porterville Junior College	B. H. Grisemer, Supt.
Reedley	Reedley Junior College	J. O. McLaughlin
Riverside	Riverside Junior College	Arthur G. Paul
Sacramento	Sacramento Junior College	R. E. Rutledge
Salinas	Salinas Evening Junior College	Helen E. Ward, Principal
Salinas	Salinas Junior College	Richard J. Werner
San Bernardino	San Bernardino Valley Union Junior College	Nicholas Ricciardi
San Diego	San Diego Junior College	Walter R. Hepner
San Diego	San Diego Vocational Junior College	John P. Gifford
San Francisco	Cogswell Polytechnical College	Robert W. Dodd
San Francisco	Lick-Wilmerding-Lux Schools	Ward H. Austin
San Francisco	San Francisco Junior College	A. J. Cloud
San Jose	San Jose District Junior College	T. W. MacQuarrie
San Luis Obispo	San Luis Obispo Junior College	Henry A. Cross, Dean
San Mateo	San Mateo Junior College	Charles S. Morris
Santa Ana	Santa Ana Junior College	D. K. Hammond
Santa Maria	Santa Maria Junior College	Andrew P. Hill, Jr.
Santa Monica	Santa Monica Junior College	Elmer C. Sandmeyer
Santa Rosa	Santa Rosa Junior College	Floyd P. Bailey
Stockton	Stockton Junior College	Dwayne Orton
Susanville	Lassen Junior College	N. H. McCollom
Taft	Taft Junior College	Stanford Hannah
Upland	Beulah College	Arthur M. Climenhaga
Ventura	Ventura Junior College	D. R. Henry
Visalia	Visalia Junior College	L. J. Williams, Principal

Colorado

City	Institution	President
Denver	Vocational College, Inc.	R. M. Shreves
Denver	Colorado Woman's College	James E. Huchingson
Grand Junction	Mesa College	Horace J. Wubben
Hesperus	Fort Lewis Branch, Colorado State College of Agriculture	Ernest H. Bader, Dean
Lamar	The Junior College of Southeastern Colorado	James H. Buchanan, Director
Pueblo	Pueblo Junior College	Charles Haines
Trinidad	Trinidad State Junior College	Peter P. Mickelson

Connecticut

City	Institution	President
Bloomfield	St. Thomas Seminary	Joseph M. Griffin
Bridgeport	Junior College of Connecticut	E. Everett Cortright
Hartford	Hillyer Junior College	Alan S. Wilson
Hartford	Morse Junior College	Wesley E. Morse
New Haven	Junior College of Commerce	Samuel W. Tator
New Haven	Junior College of Physical Therapy	Harry Eaton Stewart
New Haven	Larson Junior College	George V. Larson
New Haven	New Haven Y.M.C.A. College	Lawrence L. Bethel
New London	New London Junior College	Richard P. Saunders
Thompson	Marot Junior College	Mary L. Marot
Waterbury	Post Junior College of Commerce	Harry C. Post
West Hartford	Hartford Junior College	Grace Frick, Dean

District of Columbia

City	Institution	President
Washington	Chevy Chase Junior College	Kendric N. Marshall
Washington	Columbia Junior College	B. G. Wilkinson
Washington	The Columbus University Junior College	William E. Leahy
Washington	Fairmont Junior College	Maud van Woy
Washington	Georgetown Visitation Junior College	Sister M. M. Sheerin, Dean
Washington	Gunston Hall	Mary B. Kerr, Principal
Washington	Holton-Arms Junior College	Jessie Moon Holton
Washington	Immaculata Junior College	Sister St. Philomene
Washington	Marjorie Webster Schools, Inc.	Marjorie F. Webster
Washington	Mount Vernon Seminary	George W. Lloyd
Washington	National University Junior College	Josef Gellerman
Washington	Geo. Washington Junior College	Wm. C. Johnstone

Florida

City	Institution	President
Babson Park	Webber College	John H. Sherman
Daytona Beach	Bethune Cookman College	Mary McLeod Bethune
Jacksonville	Edward Waters College	Howard D. Gregg
St. Augustine	Florida Normal and Industrial Institute	H. R. Barksdale, Acting Principal

City	Institution	President
St. Petersburg	St. Petersburg Junior College	Robert B. Reed
Sarasota	Ringling School of Art	Verman Kimbrough
West Palm Beach	Palm Beach Junior College	John I. Leonard

Georgia

City	Institution	President
Americus	Georgia Southwestern College	Peyton Jacob
Atlanta	Atlanta Junior College	G. M. Sparks
Augusta	Junior College of Augusta	Eric W. Hardy
Barnesville	Gordon Military College	J. E. Guillebeau
Carrollton	West Georgia College	I. S. Ingram
Cochran	Middle Georgia College	L. H. Browning
Cuthbert	Andrew College	S. C. Olliff
Dahlonega	North Georgia College	Jonathan C. Rogers
Douglas	South Georgia College	J. M. Thrash
Franklin Springs	Emmanuel College	T. L. Aaron
Milledgeville	Georgia Military College	J. H. Jenkins
Mount Vernon	Brewton-Parker Institute	R. L. Robinson
Norman Park	Norman Junior College	Paul Carroll
Oxford	Emory At Oxford	George S. Roach, Division Executive
Rabun Gap	Rabun Gap-Nacoochee Junior College	George C. Bellingrath
Savannah	Armstrong Junior College	J. Thomas Askew
Tifton	Abraham Baldwin Agricultural College	G. H. King
Valdosta	Emory Junior College	A. Hollis Edens
Waleska	Reinhardt College	W. M. Bratton
Young Harris	Young Harris College	T. Jack Lance

Idaho

City	Institution	President
Boise	Boise Junior College	Eugene B. Chaffee
Coeur d'Alene	North Idaho Junior College	Orrin E. Lee
Pocatello	University of Idaho, Southern Branch	J. R. Nichols, Exec. Dean
Rexburg	Ricks College	Hyrum Wilkins Manwaring

Illinois

City	Institution	President
Carlinville	Blackburn College	William M. Hudson
Chicago	Austin Evening Junior College	C. L. MacCallum, Dean
Chicago	Carl Schurz Evening Junior College	Robert C. Keenan, Dean
Chicago	Englewood Evening College	Matthew L. Fitzgerald, Dean
Chicago	Chicago Junior College	Wm. H. Johnson
Chicago	Herzl Junior College	Dorph Brown, Dean
Chicago	Morgan Park Junior College	Albert G. Dodd, Dean
Chicago	North Park College	Algoth Ohlson
Chicago	School of Domestic Arts and Sciences	Mrs. M. Mehlig, Director
Chicago	Woodrow Wilson Junior College	John A. Bartky, Dean
Chicago	Wright Junior College	W. H. Conley, Dean
Cicero	Morton Junior College	William P. MacLean
Elgin	Elgin Academy and Junior College	Earl G. Leinbach
Evanston	Evanston Collegiate Institute	T. Otmann Firing
Godfrey	Monticello College	George Irwin Rohrbough
Harvey	Thornton Township Junior College	William E. McVey
Joliet	Joliet Junior College	Clarence Lee Jordan
La Grange	Lyons Township Junior College	Ross Holt, Dean
Lake Forest	Ferry Hall Junior College	Eloise R. Tremain
La Salle	La Salle-Peru-Oglesby Junior College	Frank A. Jensen
Lincoln	Lincoln College	Wm. D. Copeland
Mt. Carroll	Frances Shimer Junior College	A. C. Bro
Park Ridge	Maine Township Junior College	T. R. Foulkes
Springfield	Springfield Junior College	Mother M. Barbara
Westmont	St. Joseph's College	Dominic Limacher
Wilmette	Mallinkrodt College	Mother Ignata

Indiana

City	Institution	President
Donaldson	Ancilla Domini College	Mother M. Therese
Fort Wayne	Concordia College	Ottomar Krueger
Gary	Gary College	Herbert S. Jones
Kokomo	Kokomo Junior College	Hurd Allyn Drake
Vincennes	Vincennes University Junior College	Walter A. Davis

Iowa

City	Institution	President
Albia	Albia Junior College	Donald O. Smith, Dean
Bloomfield	Bloomfield Junior College	E. T. Carlstedt, Dean
Boone	Boone Junior College	J. R. Thorngren, Dean
Britt	Britt Public Junior College	L. J. Thies, Supt. of Schools
Burlington	Burlington Junior College	Robert White, Jr.
Cedar Rapids	Mount Mercy Junior College	Sister Mary Maura
Centerville	Centerville Junior College	E. W. Fannon, Supt. of Schools
Chariton	Chariton Junior College	F. A. Lunan, Dean
Clarinda	Clarinda Junior College	Herbert L. Glynn
Clinton	Mount St. Clare College and Academy	Mother M. Paul Carrico
Creston	Creston Junior College	Burton R. Jones, Supt. of Schools
Des Moines	Dowling College	J. J. Boylan
Des Moines	Grand View College	Alfred C. Nielsen
Eagle Grove	Eagle Grove Junior College	C. L. McDowell
Elkader	Elkader Junior College	George Manus
Emmetsburg	Emmetsburg Junior College	D. L. Hempstead
Estherville	Estherville Junior College	Warner Kirlin, Dean
Forest City	Waldorf College	J. L. Rendahl
Fort Dodge	Fort Dodge Junior College	Harris Dickey, Dean
Hopkinton	Lenox College	A. H. Volle
Independence	Independence Junior College	F. E. Mueller, Dean
Iowa Falls	Ellsworth Junior College	Orlando C. Kreider, Dean
Lamoni	Graceland College	George N. Briggs
Maquoketa	Maquoketa Junior College	E. L. Miller, Dean
Marshalltown	Marshalltown Junior College	B. R. Miller
Mason City	Mason City Junior College	James Rae
Muscatine	Muscatine Junior College	Willetta Strahan, Dean
Orange City	Northwestern Junior College	Jacob Heemstra
Osceola	Osceola Junior College	L. L. Hagie, Supt.
Ottumwa	Ottumwa Heights College	Mother Mary Geraldine Upham
Red Oak	Red Oak Public Junior College	J. R. Inman
Sheldon	Sheldon Junior College	W. C. Jackman
Tipton	Tipton Junior College	H. C. DeKock, Supt.
Washington	Washington Junior College	Harland W. Mead
Waukon	Waukon Junior College	R. K. Orr
Webster City	Webster City Junior College	W. D. Wesselink, Dean

Kansas

City	Institution	President
Arkansas City	Arkansas City Junior College	C. E. St. John
Chanute	Chanute Junior College	W. W. Bass, Dean
Coffeyville	Coffeyville Junior College	W. M. Ostenberg, Dean
Dodge City	Dodge City Junior College	R. C. Hunt, Dean
El Dorado	El Dorado Junior College	Earl Walker, Dean
Fort Scott	Fort Scott Junior College	W. S. Davison, Dean
Garden City	Garden City Junior College	J. R. Jones, Dean
Haviland	Friends Bible College	Charles A. Beals
Hays	St. Joseph's College and Military Academy	Terrence Moffatt
Hesston	Hesston College & Bible School	Milo Franklin Kauffman
Highland	Highland Junior College	C. M. Rankin, Dean
Hillsboro	Tabor College	Abraham E. Janzen
Hutchinson	Hutchinson Junior College	C. M. Lockman, Dean
Independence	Independence Junior College	E. R. Stevens, Dean
Iola	Iola Junior College	R. H. Carpenter
Kansas City	Kansas City Junior College	J. F. Wellemeyer
Kansas City	Western University	Dan C. Matthews, Supt.
McPherson	Central College	Orville S. Walters
Miltonvale	Miltonvale Wesleyan College	C. Floyd Hester
Paola	College of Paola	Mother Thomas Reichert
Parsons	Parsons Junior College	E. F. Farner, Dean
Pratt	Pratt Junior College	H. B. Unruh
Wichita	Sacred Heart Junior College	Leon A. McNeill
Winfield	St. John's College	Carl S. Mundinger

Kentucky

City	Institution	President
Ashland	Ashland Junior College	Arville Wheeler
Campbellsville	Campbellsville College	W. F. Jones
Columbia	Lindsey Wilson Junior College	Aaron P. White
Hopkinsville	Bethel Woman's College	Kenneth R. Patterson
Jackson	Lees Junior College	J. O. Van Meter
London	Sue Bennett College	Kenneth C. East
Louisville	Ursuline College	Mother M. Roberta
Maple Mount	Mount St. Joseph Junior College	Sister M. Christina, Dean
Nazareth	Nazareth Junior College and Academy	Sister Margaret Gertrude, Dean
Nerinx	Loretto Junior College	Mother M. Linus
Paducah	Paducah Junior College	R. G. Matheson, Jr.,
Pikeville	Pikeville College	A. A. Page, Acting
Pippapass	Caney Junior College	Woodrow W. Allen, Dean

City	Institution	President
St. Catherine	St. Catherine Junior College	Mother Mary Louis
St. Mary	St. Mary's College	Francis J. Jaglowicz
Williamsburg	Cumberland College	James L. Creech

Louisiana

City	Institution	President
Grand Coteau	College of the Sacred Heart	Mother M. Erskine
Lafayette	De LaSalle Normal School	Brother A. Ernest
Lake Charles	John McNeese Junior College of Louisiana State University	Rodney Cline, Dean
Monroe	Northeast Junior College of Louisiana State University	C. C. Colvert, Dean
Shreveport	Dodd College	A. L. Tatum, Dean

Maine

City	Institution	President
Houlton	Ricker Junior College	Roy M. Hayes
Kents Hill	Kents Hill Junior College	Edward W. Hincke
Portland	Portland Junior College	Luther I. Bonney
Portland	Westbrook Junior College	Milton D. Proctor
Vassalboro	Oak Grove Junior College	R. E. Owen

Maryland

City	Institution	President
Baltimore	Junior College, University of Baltimore	Theodore Halbert Wilson
Baltimore	Mt. St. Agnes Junior College	Sister M. Placide Thomas
Catonsville	St. Charles College	George A. Gleason
Forest Glen	National Park College	Roy T. Davis
St. Mary's City	St. Mary's Female Seminary—Junior College	M. Adele France

Massachusetts

City	Institution	President
Auburndale	Lasell Junior College	Guy M. Winslow
Boston	Burdett College	C. F. Burdett
Boston	Chamberlain School	E. K. Chamberlain, Director
Boston	Chamberlayne Junior College	Theresa F. Leary
Boston	Chandler Schools	Alan W. Furber
Boston	Erskine College	Edith A. Richardson, Director
Boston	The Garland School	Gladys Beckett Jones
Boston	Stratford School	Matthew Malloy
Boston	Stuart School	Beatrice L. Williams, Director
Bradford	Bradford Junior College	Dorothy M. Bell
Cambridge	Cambridge Junior College	Irving T. Richards, Director
Dudley	Nichols Junior College	James L. Conrad
Newton Center	Mt. Ida Junior College	William Fitts Carlson
Pride's Crossing	Endicott Junior College	George O. Bierkoe
Springfield	Bay Path Institute of Commerce	Charles F. Gaugh
Waltham	The Junior College of Middlesex University	C. Ruggles Smith
Wellesley	Pine Manor Junior College	Mrs. Marie W. Potter
Worcester	Becker College	Warren C. Lane
Worcester	Worcester Junior College	W. Albert Lotz

Michigan

City	Institution	President
Bay City	Bay City Junior College	George E. Butterfield Dean
Big Rapids	Ferris Institute Junior College	M. S. Ward
Dearborn	Fordson Junior College	Kenneth M. MacLeod, Dean
Flint	Flint Junior College	W. S. Shattuck, Dean
Grand Rapids	Aquinas College	A. F. Bukowski
Grand Rapids	Grand Rapids Junior College	Arthur Andrews
Hancock	Suomi College	V. K. Nikander
Highland Park	Highland Park Junior College	George I. Altenburg, Dean
Ironwood	Gogebic Junior College	R. Ernest Dear, Dean
Jackson	Jackson Junior College	H. A. Steele, Supt.
Muskegon	Muskegon Junior College	A. G. Umbreit
Plymouth	Presentation Junior College	Sister M. Annunciata
Port Huron	Port Huron Junior College	Thomas C. Simpson, Acting Dean
Spring Arbor	Spring Arbor Seminary & Junior College	LeRoy M. Lowell

Minnesota

City	Institution	President
Albert Lea	Albert Lea Junior College	Clair Jordan, Dean
Austin	Austin Junior College	R. I. Meland, Dean
Brainerd	Brainerd Junior College	Emil Heintz
Coleraine	Itasca Junior College	Joseph B. Davis, Dean
Crosby	Crosby-Ironton Junior College	Thomas W. Simons
Duluth	Duluth Junior College	R. D. Chadwick, Dean
Ely	Ely Junior College	Sigurd F. Olson
Eveleth	Eveleth Junior College	O. H. Gibson
Faribault	Saint Mary's Hall	Margaret Robertson
Hibbing	Hibbing Junior College	H. A. Drescher
Mankato	Bethany Lutheran College	S. C. Ylvisaker
Rochester	Rochester Junior College	R. W. Goddard
St. Paul	Bethel Junior College	Emery A. Johnson, Dean
St. Paul	Concordia College	Martin Graebner
Tracy	Tracy Junior College	E. H. Stock
Virginia	Virginia Junior College	Floyd B. Moe, Dean
Worthington	Worthington Junior College	Marvin C. Knudson, Dean

Mississippi

City	Institution	President
Brookhaven	Whitworth College	Sinclair Daniel
Clinton	Hillman College	M. P. L. Berry
Decatur	East Central Junior College	L. O. Todd
Edwards	Southern Christian Institute	John Long
Ellisville	Jones County Junior College	James Gonnard Young
Goodman	Holmes Junior College	R. M. Branch
Gulfport	Gulf Park College	Richard G. Cox
Mathiston	Wood Junior College	Edward W. Seay
Meridian	Meridian Municipal Junior College	J. L. McCaskill, Principal
Moorhead	Sunflower Junior College	Paul M. West
Newton	Clarke Memorial College	W. L. McMullan
Okolona	Okolona Industrial School	Richard T. Middleton
Perkinston	Harrison-Stone-Jackson Junior College	A. L. May
Poplarville	Pearl River Junior College	R. E. L. Sutherland
Raymond	Hinds Junior College	G. M. McLendon
Scooba	East Mississippi Junior College	J. M. Tubb
Senatobia	Northwest Mississippi Junior College	R. C. Pugh
Summit	Southwest Mississippi Junior College	J. M. Kenna
Vicksburg	All Saints' Episcopal College	W. G. Christian, Rector
Wesson	Copiah Lincoln Junior College	James M. Ewing
West Point	Mary Holmes Junior College	Graham F. Campbell

Missouri

City	Institution	President
Bolivar	Southwest Baptist College	Courts Redford
Boonville	Kemper Military School	A. M. Hitch
Columbia	Christian College	J. C. Miller
Columbia	Stephens College	James M. Wood
Conception	Conception Junior College	Stephen Schappler
Concordia	St. Paul's College	Albert J. C. Moeller
Flat River	Junior College of Flat River	W. A. Deneke
Fulton	William Woods College	H. L. Smith
Hannibal	Hannibal-LaGrange Junior College	A. E. Prince
Iberia	Iberia Junior College	G. Byron Smith
Jefferson City	Jefferson City Junior College	Wade C. Fowler
Joplin	Joplin Junior College	E. A. Elliott
Kansas City	College of St. Teresa	Sister M. Simplicia
Kansas City	Kansas City Junior College	A. M. Swanson
Kansas City	Lincoln Junior College	H. O. Cook
Lexington	Wentworth Military Academy	J. MacBrayers Sellers
Moberly	Moberly Junior College	M. F. Beach
Monett	Monett Junior College	E. E. Camp
Nevada	Cottey Junior College for Women	Marjorie Mitchell
St. Joseph	St. Joseph Junior College	Nelle Blum, Dean
St. Louis	Notre Dame Junior College	Sister Mary Chrysologa
Trenton	Trenton Junior College	S. M. Rissler
Warrenton	Central Wesleyan College	C. A. Greene

Montana

City	Institution	President
Billings	Billings Polytechnic Junior College	J. S. Pennepacker
Great Falls	Great Falls Junior College	James Donovan
Havre	Northern Montana College	G. H. Vande Bogart
Miles City	Custer County Junior College	G. H. Gloege, Dean

Nebraska

City	Institution	President
Hebron	Hebron Junior College	K. F. Weltner
McCook	McCook Junior College	F. L. Holmes
Omaha	College of Saint Mary	Sister Mary Rosaria
Scottsbluff	Scottsbluff Junior College	J. E. Shedd, Supt.
Wahoo	Luther College	Paul M. Lindberg

New Hampshire

City	Institution	President
New London	Colby Junior College	H. Leslie Sawyer
Rye Beach	Stoneleigh College	Richard D. Currier
Tilton	Tilton Junior College	James E. Coons

New Jersey

City	Institution	President
Belmar	The King's College	Percy B. Crawford
Camden	The College of South Jersey	Arthur E. Armitage
Hackettstown	Centenary Junior College	Robert J. Trevorrow
Lodi	Immaculate Conception Junior College	Sister N. Simplicia
Long Branch	Monmouth Junior College	Edward G. Schlaefer, Dean
Morristown	Morris Junior College	Arthur S. Platt
Newark	Essex Junior College	Adolph M. Koch
Newark	Newark Junior College	David Bucharest
Newark	Whitman Junior College	Cecelia Kemberton
Paterson	College of Paterson	Herbert S. Robinson
Perth Amboy	Middlesex Junior College	Ladd M. Lukats, Dean
Roselle	Union Junior College	Charles G. Cole
Teaneck	Bergen Junior College	C. L. Littel

New Mexico

City	Institution	President
Portales	Eastern New Mexico College	Floyd D. Golden
Roswell	New Mexico Military Institute	D. C. Pearson

New York

City	Institution	President
Alfred	N. Y. State Agric. & Tech. Inst.	Paul B. Orvis, Director
Briarcliff Manor	Briarcliff Junior College	Mrs. Ordway Tead
Bronxville	Concordia Collegiate Institute	Arthur J. Doege
Brooklyn	The Packer Collegiate Institute	Paul D. Shafer
Canton	N. Y. State Agric. & Tech. Inst.	V. C. Wittenmore
Cazenovia	Cazenovia Junior College	Burritt C. Harrington
Cobleskill	N. Y. State Inst. of Agric. and H. Ec.	A. E. Champlin
Delhi	N. Y. State Agric. & Tech. Inst.	Harlond L. Smith
Farmingdale	N. Y. State Inst. of Agric.	H. B. Knapp
Millbrook	Bennett Junior College	Courtney Carroll
Morrisville	N. Y. State Agric. & Tech. Inst.	M. B. Galbreath
New York	Finch Junior College	Jessica G. Cosgrave
New York	Packard School	Louis A. Rice

North Carolina

City	Institution	President
Asheville	Biltmore College	J. J. Stevenson, Jr.
Asheville	St. Genevieve-of-the-Pines	Mother A. Foret
Banner Elk	Lees-McRae College	Edgar H. Tufts
Belmont	Belmont Abbey College	V. G. Taylor, Rector
Belmont	Sacred Heart Junior College	Sister M. Raphael
Boiling Springs	Boiling Springs Junior Baptist College	John R. Cantrell
Brevard	Brevard College	Eugene J. Coltrane
Buies Creek	Campbell College	L. H. Campbell
Concord	Barber-Scotia Junior College	L. S. Cozart
Greensboro	Immanuel Lutheran College	Henry Nan
Louisburg	Louisburg College	Walter Patten
Mars Hill	Mars Hill College	Hoyt Blackwell
Maxton	Presbyterian Junior College	Louis C. La Motte
Misenheimer	Pfeiffer Junior College	W. S. Sharp
Montreat	Montreat College	R. C. Anderson
Murfreesboro	Chowan Junior College	H. Haddon Dudley
Oak Ridge	Oak Ridge Military Institute	T. O. Wright
Raleigh	Peace Junior College	William C. Pressly
Raleigh	St. Mary's School & Junior College	Mrs. Ernest Cruikshank
Salemburg	Pineland College and Edwards Military Institute	W. J. Jones
Statesville	Mitchell College	Grace Kirkpatrick Ramsay
Wingate	Wingate Junior College	Craven Cullen Burris

North Dakota

City	Institution	President
Bismarck	Bismarck Junior College	Walter J. Swenson
Bottineau	North Dakota School of Forestry	A. F. Arnason
Wahpeton	North Dakota State School of Science	E. F. Riley

Ohio

City	Institution	President
Columbus	Office Training School	R. E. Hoffhines
Dayton	Dayton Y.M.C.A. College	Theo. J. Christensen
Oberlin	Oberlin School of Commerce	J. H. Kutscher
Rio Grande	Rio Grande Junior College	R. Lloyd Pabst
Tiffin	Tiffin University	F. J. Miller
Toledo	The Junior College of the University of Toledo	Raymond L. Carter
Urbana	Urbana Junior College	Russell Eaton

Oklahoma

City	Institution	President
Altus	Altus Junior College	A. G. Steele
Bacone	Bacone Junior College	W. W. Dolan, Dean
Bartlesville	Bartlesville Junior College and High School	Paul C. Norvell
Bristow	Bristow Junior College	E. H. Black
Carnegie	Carnegie Junior College	B. F. Johnson
Claremore	Oklahoma Military Academy	J. C. Hamilton
Duncan	Duncan Junior College	Dion C. Wood
El Reno	El Reno Junior College	Paul R. Taylor
Frederick	Tillman County Junior College	W. F. Randle
Hobart	Kiowa County Junior College	B. A. McElyea
Lawton	Cameron State Agricultural College	Charles M. Conwill
Mangum	Mangum Junior College	Elmer Fraker
Miami	Northeastern Oklahoma Junior College	Sabin C. Percefull
Muskogee	Muskogee Junior College	Bessie M. Huff, Dean
Oklahoma City	Oklahoma City Junior College	H. E. Wrinkle
Okmulgee	Okmulgee Junior College	W. Max Chambers, Supt.
Sapulpa	Sapulpa Junior College	James L. Prince
Sayre	Oklahoma Western Junior College	Oscar McMahan
Seminole	Seminole Junior College	John G. Mitchell
Shawnee	St. Gregory's College	Mark F. Braun
Shidler	Shidler Junior College	M. B. Nelson
Tishomingo	Murray State School of Agriculture	M. C. Courtney
Tonkawa	Northern Oklahoma Junior College	Loren N. Brown
Tulsa	Monte Cassino Junior College	Sister M. Ursula
Warner	Connors State Agricultural College	Jacob Johnson
Wilburton	Eastern Oklahoma A. & M. College	C. C. Dunlap
Woodward	Woodward Junior College	R. R. Russell

Oregon

City	Institution	President
Portland	St. Helen's Hall	Sister W. Lucia
Portland	Multnomah College	Edward L. Clark

Pennsylvania

City	Institution	President
Altoona	Altoona Undergraduate Center	R. E. Eiche
Bryn Mawr	Harcum Junior College	Edith H. Harcum
Cambridge Springs	Alliance College	John J. Kolasa
Chambersburg	Penn Hall Junior College & Preparatory School	Frank S. Magill
DuBois	The DuBois Undergraduate Center	Edwin W. Zoller, Administrative Head
Erie	Erie Center, University of Pittsburgh	J. Lloyd Mahoney, Administrative Head
Erie	St. John Kanty College	Stephen Krol
Grantham	Messiah Bible College	C. N. Hostetter, Jr.
Harrisburg	Harrisburg Academy and Junior College	Frank C. Baldwin
Hazleton	Hazleton Undergraduate Center, The Pennsylvania State College	Coleman Herpel, Administrative Head
Hershey	Hershey Junior College	A. G. Breidenstine, Dean
Johnstown	Johnstown Center, University of Pittsburgh	Viers W. Adams, Head
La Plume	Scranton-Keystone Junior College	Byron S. Hollinshead
Lititz	Linden Hall Junior College	F. W. Stengel
Pottsville	Schuylkill Undergraduate Center, The Pennsylvania State College	R. Wallace Brewster
Rydal	Ogontz Junior College	Abby A. Sutherland
Swarthmore	Wildcliff Junior College	H. M. Crist, Director
Washington	Washington Seminary	Mrs. E. K. Maxfield
Wayne	Valley Forge Military Junior College	Milton G. Baker
Wilkes-Barre	Bucknell University Junior College	Eugene S. Farley, Director
Williamsport	Williamsport Dickinson Seminary and Junior College	John W. Long
Wyomissing	Wyomissing Polytechnic Institute	Arthur C. Harper

South Carolina

City	Institution	President
Anderson	Anderson College	Annie D. Denmark
Central	Wesleyan Methodist College	John F. Childs

City	Institution	President
Charleston	Avery Institute	L. Howard Bennett
Cheraw	Coulter Memorial Academy	George Waldo Long
Denmark	Voorhees Junior College	J. E. Blanton
Rock Hill	Clinton Normal and Industrial College	Edward Warner Brice
Rock Hill	Friendship Junior College	James H. Goudlock
Seneca	Seneca Junior College	J. D. Bryan
Spartanburg	Textile Industrial Institute	R. B. Burgess
Tigerville	North Greenville Junior College	M. C. Donnan
Trenton	Bettis Junior College	A. W. Nicholson

South Dakota

City	Institution	President
Freeman	Freeman Junior College	John D. Unruh
Mitchell	Notre Dame Junior College	J. M. Brady
Wessington Springs	Wessington Springs College	W. A. Harden
Yankton	Mt. Marty Junior College	Mother M. Jerome

Tennessee

City	Institution	President
Athens	Tennessee Wesleyan College	James L. Robb
Collegedale	Southern Junior College	J. C. Thompson
Henderson	Freed-Hardeman College	N. B. Hardeman
Madisonville	Hiwassee College	T. A. Frick
Martin	The University of Tennessee Junior College	Paul Meek
Morristown	Morristown College	J. W. Haywood
Nashville	David Lipscomb College	E. H. Ijams
Nashville	Peabody Junior College	Joseph Roemer
Nashville	Trevecca Nazarene College	A. B. Mackey
Nashville	Ward-Belmont School	Joseph E. Burk
Pulaski	Martin College	J. H. Swann
Rogersville	Swift Memorial Junior College	R. E. Lee

Texas

City	Institution	President
Amarillo	Amarillo College	J. F. Mead
Arlington	North Texas Agricultural College	E. E. Davis, Dean
Beaumont	Lamar College	John E. Gray, Director
Brenham	Blinn College	Charles F. Schmidt
Brownsville	Brownsville Junior College	Ben L. Brite
Cisco	Cisco Junior College	H. R. Garrett, V. P.
Clarendon	Clarendon Junior College	H. T. Burton
Clifton	Clifton Junior College	C. Tyssen
Conroe	Conroe N. and I. College	Wm. A. Johnson
Corpus Christi	Corpus Christi Junior College	M. P. Baker
Crockett	Mary Allen Junior College	T. B. Jones
Dallas	Hockaday Junior College	Ela Hockaday
Dallas	Terrill Junior College	S. M. Davis
Decatur	Decatur Baptist College	J. L. Ward
Edinburg	Edinburg Junior College	R. P. Ward, Director
Fort Worth	Our Lady of Victory College	Sister M. Albertine
Gainesville	Gainesville Junior College	H. O. McCain
Goose Creek	Lee Junior College	N. S. Holland
Hillsboro	Hillsboro Junior College	L. W. Hartsfield
Houston	University of Houston	E. E. Oberholtzer
Jacksonville	Lon Morris College	C. E. Peeples
Keene	Southwestern Junior College	H. H. Hamilton
Kerrville	Schreiner Institute	J. J. Delaney
Kilgore	Kilgore College	B. E. Masters, Dean
Marshall	College of Marshall	F. S. Groner
Paris	Paris Junior College	J. R. McLemore
Plainview	Wayland College	G. W. McDonald
Ranger	Ranger Junior College	G. C. Boswell
San Angelo	San Angelo College	Wilson H. Elkins
San Antonio	San Antonio Junior College	J. O. Loftin
San Antonio	St. Philip's Junior College and Vocational School	A. Bowden
Seguin	Texas Lutheran College	Wm. F. Kraushaar
Stephenville	John Tarleton Agricultural College	J. Thomas Davis, Dean
Tehuacana	Westminster College	Sprigg Harwood
Temple	Temple Junior College	George H. Gentry
Terrell	Texas Military College	Mrs. Louis C. Perry
Texarkana	Texarkana Junior College	H. W. Stilwell
Tyler	Butler College	Isaiah Jackson
Tyler	Tyler Junior College	J. M. Hodges
Victoria	Victoria Junior College	J. H. Bankston
Weatherford	Weatherford College	Clarence A. Sutton
Wichita Falls	Hardin Junior College	Geo. M. Crutsinger

Utah

City	Institution	President
Cedar City	Branch Agriculture College	E. G. Peterson
Ephraim	Snow College	James A. Nuttall
Ogden	Weber College	H. A. Dixon
Price	Carbon College	Elden B. Sessions
St. George	Dixie Junior College	Glenn E. Snow
Salt Lake City	Westminster College	Robert D. Steele

Vermont

City	Institution	President
Montpelier	Vermont Junior College	John H. Kingsley
Plainfield	Goddard College	Royce Stanley Pitkin
Poultney	Green Mountain Junior College	Jesse P. Bogue

Virginia

City	Institution	President
Arlington	Arlington Hall Junior College	Carrie Sutherlin
Blackstone	Blackstone College for Girls	J. Paul Glick
Bluefield	Bluefield College	Edwin C. Wade
Bristol	Sullins College	W. E. Martin
Bristol	Virginia Intermont College	H. G. Noffsinger
Buena Vista	Southern Seminary & Junior College	Robert Lee Durham
Danville	Averett College	Curtis Vance Bishop
Danville	Stratford College	John C. Simpson
Dayton	Shenandoah College	Wade S. Miller
Ferrum	Ferrum Junior College	J. A. Chapman
Harrisonburg	Eastern Mennonite School	John L. Stauffer
Marion	Marion College	Hugh J. Rhyne
Norfolk	Norfolk Division, College of William and Mary	John Stewart Bryan
Waynesboro	Fairfax Hall Junior College	W. B. Gates

Washington

City	Institution	President
Aberdeen	Grays Harbor Junior College	Lewis C. Tidball
Centralia	Centralia Junior College	Margaret Corbet
Longview	Lower Columbia Junior College	T. D. Schindler
Mount Vernon	Mount Vernon Junior College	Charles H. Lewis
Parkland	Pacific Lutheran College	O. A. Tingelstad
Spokane	Spokane Junior College	G. H. Schlauch
Vancouver	Clark Junior College	Paul F. Gaiser
Wenatchee	Wenatchee Junior College	W. B. Smith
Yakima	Yakima Valley Junior College	Elizabeth Prior

West Virginia

City	Institution	President
Beckley	Beckley College	D. K. Shoyer, Bus. Mgr.
Keyser	Potomac State School of West Virginia University	E. E. Church
Lewisburg	Greenbrier College	French W. Thompson

Wisconsin

City	Institution	President
Beaver Dam	Wayland Junior College	Stanley C. Ross
Milwaukee	Concordia College	Leroy C. Rincker
Milwaukee	Vocational Junior College	W. F. Rasche
Milwaukee	Extension Division, University of Wisconsin	C. M. Purin
Mt. Calvary	St. Lawrence Junior College	T. Foley
St. Nazianz	Salvatorian Seminary	S. B. Freischmidt

Canal Zone

City	Institution	President
Balboa	Canal Zone Junior College	R. C. Hackett, Chairman of Faculty

Canada

City	Institution	President
Calgary, Alta.	Mount Royal Junior College	George W. Kerby

SECTION XIV
HEADS OF PRIVATE SCHOOLS

Alabama

City	Institution	Head
Fairhope	School of Organic Education	S. W. Alexander
Mobile	University Military School	William S. Pape
Thorsby	Thorsby Institute	Helen C. Jenkins

California

City	Institution	Head
Berkeley	Anna Head School	T. R. Hyde
Beverly Hills	Berkeley Hall School	Mary E. Stevens
Claremont	Webb School of California	Thompson Webb
La Jolla	The Bishop's School	Caroline S. Cummins
Los Angeles	Cumnock School	Raymond C. Brooks
Los Angeles	Marlborough School for Girls	Ada S. Blake
Los Angeles	Urban Academy, Inc.	P. G. McDonnell
Los Angeles	Westlake School for Girls	Frederica de Laguna
Los Gatos	Montezuma Mt. Ranch School	E. A. Rogers
North Hollywood	Harvard School	Robert B. Gooden
Pacific Beach	Brown Military Academy	Charles Bain
Palo Alto	Castilleja School	Richard Lockey
Palo Alto	Miss Harker's School	Sara D. Harker
Pasadena	Westridge School for Girls	Louise Holabird Wood
San Francisco	Miss Burke's School	Barbara Burke
San Francisco	Drew School	John S. Drew
San Francisco	Sarah Dix Hamlin School	Mrs. E. B. Stanwood
San Rafael	San Rafael Military Academy	Robert U. Ricklefs
San Rafael	The Tamalpais School	Charles J. Keppel

Colorado

City	Institution	Head
Colorado Springs	Fountain Valley School	Francis Mitchell Froelicher
Denver	Kent School for Girls	Mary A. Bogue

Connecticut

City	Institution	Head
Avon	Avon Old Farms	W. Brooke Stabler
Cheshire	Cheshire Academy	Arthur N. Sheriff
Clinton	Morgan School	Walter W. Moore
Farmington	Miss Porter's School	Robert Porter Keep
Greenwich	Brunswick School	William L. Henry
Greenwich	The Edgewood School	Euphrosyne E. Langley
Greenwich	Greenwich Academy	Ruth West Campbell
Greenwich	Rosemary Hall	Mrs. R. R. Evers, Mrs. H. H. Jessup
Hartford	Oxford School	Elizabeth M. Fitch
Kent	Kent School	Wm. S. Chalmers
Lakeville	Hotchkiss School	George Van Santvoord
Middlebury	Westover School	Louise B. Dillingham
Milford	The Milford School	William D. Pearson
New Haven	Collegiate School, Inc.	Samuel Pite
New Haven	The Day School	Julia B. Thomas
New Haven	Hamden Hall Country Day School	E. Stanley Taylor
New Haven	Hopkins Grammar School	George B. Lovell
New London	Bulkeley School	Homer K. Underwood
New Milford	Canterbury School	Nelson Hume
Norwich	Norwich Free Academy	George E. Shattuck
Pomfret	Pomfret School	Halleck Lefferts
Rowayton	The Thomas School	Mabel Thomas
Salisbury	Salisbury School	Emerson B. Quaile
Simsbury	Ethel Walker School	Mrs. Elliott Speer
Simsbury	Westminster School	Arthur Milliken
South Kent	South Kent School	Samuel S. Bartlett
Stamford	The King School	V. A. Dwelle
Stamford	Low-Heywood School	Mary R. Roper
Suffield	Suffield Academy	Conrad Hahn
Wallingford	The Choate School	George C. St. John
Washington	The Gunnery School	Tertius van Dyke
Washington	Wykeham Rise School	
Waterbury	St. Margaret's School	Alberta C. Edell
Watertown	The Taft School	Paul F. Cruikshank
West Hartford	Kingswood School	G. R. H. Nicholson
Windsor	The Loomis School	N. H. Batchelder
Winsted	The Gilbert School	Henry S. Moseley

Delaware

City	Institution	Head
Middletown	St. Andrew's School	Walden Pell 2nd
Wilmington	Friends School	Wilmot R. Jones
Wilmington	Tower Hill School	James S. Guernsey

District of Columbia

City	Institution	Head
Washington	Devitt School	J. F. Byerly
Washington	Dunbarton College of Holy Cross	Mother M. Rose Elizabeth
Washington	Emerson Institute	John J. Humphrey
Washington	Georgetown Visitation Convent	Sister Margaret Mary Sheerin
Washington	Gunston Hall	Mary B. Kerr
Washington	Holton-Arms School and Junior College	Mrs. Jessie M. Holton
Washington	Immaculata Seminary	Sister Virginia
Washington	National Cathedral School	Mabel B. Turner
Washington	St. Albans	Albert H. Lucas
Washington	Sidwell Friends School	Albert E. Rogers

Florida

City	Institution	Head
Jacksonville	The Bolles School	Roger M. Painter
Miami	Miss Harris' Florida School	Julia F. Harris
Miami Beach	Coburn School	Nelson Coburn
Orlando	Cathedral School for Girls	Mrs. Louise C. Massey
Palm Beach	Palm Beach Private School	Karl B. Dearborn
St. Leo	St. Leo College Prep School	Ernest Schultz
St. Petersburg	Aikin Open Air School	Mrs. Dean Aikin
St. Petersburg	Florida Military Academy	Lee G. Jones

Georgia

City	Institution	Head
Atlanta	North Avenue Presbyterian School	Thyrza S. Askew
Atlanta	University School for Boys	W. E. Dendy
Atlanta	Washington Seminary	Emma B. Scott
College Park	Georgia Military Academy	William R. Brewster
Gainesville	Riverside Military Academy	Sandy Beaver
Oxford	Emory at Oxford	H. C. Cox
Rome	Darlington School	C. R. Wilcox
Savannah	Pape School	Nina A. Pape

Illinois

City	Institution	Head
Aledo	Roosevelt Military Academy	Karl J. Stouffer
Alton	Western Military Academy	C. L. Persing
Chicago	Chicago Latin School	James O. Wood
Chicago	The Faulkner School	Elizabeth Faulkner
Chicago	The Girls Latin School of Chicago	Elizabeth Singleton
Chicago	Harvard School for Boys	Elsie Schobinger
Chicago	Loring School	Cecilia Russell
Chicago	Luther Institute	John C. Anderson
Chicago	Morgan Park Military Academy	Hugh G. Price
Chicago	Francis W. Parker School	Herbert W. Smith
Chicago	Stickney School	Stanley M. Durrant
Chicago	University High School	P. B. Jacobson
Elgin	Elgin Academy	Earl G. Leinbach
Evanston	Marywood School	Sister Margaret Agnes
Evanston	Roycemore School	Mrs. Keith Preston
La Grange	Broadview Academy	G. W. Habenicht
Lake Forest	Ferry Hall	Eloise R. Tremain
Lake Forest	Lake Forest Academy	E. Frances Bowditch
Mooseheart	Mooseheart School	W. J. Leinweber
Onarga	Onarga Military School	Lyle M. Bittinger

City	Institution	Head
Rock Island	Villa De Chantal	Sister Marie
Winnetka	The North Shore Country Day School	Perry D. Smith

Indiana

City	Institution	Head
Culver	Culver Military Academy	W. E. Gregory
Howe	Howe School	F. M. Little
Indianapolis	Tudor Hall School	I. Hilda Stewart

Iowa

City	Institution	Head
Dubuque	Loras Academy	N. C. Barrett

Kansas

City	Institution	Head
Salina	St. John's Military School	R. L. Clem, Supt.

Kentucky

City	Institution	Head
Lexington	Sayre School for Girls	J. C. Hanley
Louisville	Kentucky Home School for Girls	Annie S. Anderson
Louisville	Louisville Collegiate Institute	Dorothy Graff
Lyndon	Kentucky Military Institute	N. C. Hodgin
Millersburg	Millersburg Military Institute	W. R. Nelson
Shelbyville	Science Hill School	Juliet J. Poynter

Louisiana

City	Institution	Head
New Orleans	Gilbert Academy	Margaret Davis Bowen
New Orleans	Louise S. McGehee School	Nina P. Davis
New Orleans	Metairie Park Country Day School	Ralph E. Boothby
New Orleans	Isidore Newman School	C. C. Henson

Maine

City	Institution	Head
Bethel	Gould Academy	Elwood F. Ireland
Charleston	Higgins Classical Institute	Wm. A. Tracy
Dover-Foxcroft	Foxcroft Academy	C. E. Wood
Fryeburg	Fryeburg Academy	Elroy O. LaCasce
Houlton	Ricker Classical Institute & Junior College	R. M. Hayes
North Bridgton	Bridgton Academy	H. H. Sampson
Pittsfield	Maine Central Institute	Edwin M. Purinton
Portland	The Waynflete School	Barbara Woodruff Freeman
Saco	Thornton Academy	Hollis A. Sanderson
South Berwick	Berwick Academy	Ercell M. Gordon
Waterville	Coburn Classical Institute	Hugh A. Smith

Maryland

City	Institution	Head
Baltimore	Boys' Latin School	Frederick A. Hahn
Baltimore	Bryn Mawr School	Katherine Van Bibber
Baltimore	Friends School	Edwin C. Zavitz
Baltimore	Gilman Country School	E. Boyd Morrow
Baltimore	Girls' Latin School	Lillian M. Kloppel
Baltimore	Mount St. Agnes School	Sister Mary Aimee
Baltimore	Mt. St. Joseph's College	Brother Oswald
Baltimore	Notre Dame of Maryland School	Sister Mary Coeline
Baltimore	Park School	Hans Froelicher, Jr.
Baltimore	Roland Park Country School	Elizabeth M. Castle
Catonsville	St. Timothy's School	Ella R. Watkins
Charlotte Hall	Charlotte Hall School	M. D. Burgee
Garrett Park	Georgetown Preparatory School	Robert P. Arthur
Garrison	Garrison Forest School	Jean G. Marshall
Glencoe	Oldfields School, Inc.	Duncan McCulloch
McDonogh	McDonogh School	Louis E. Lamborn
Port Deposit	The Jacob Tome Institute	Ernest H. Suerken
Reisterstown	The Hannah More Academy	Laura Fowler
Ruxton	Greenwood School	Mary A. Elcock
St. James	St. James School	James B. Drake
Severna Park	Severn School	Rolland M. Teel
Towson	Loyola High School	John A. Convery

Massachusetts

City	Institution	Head
Andover	Abbot Academy	Marguerite Hearsey
Andover	Phillips Academy	Claude Moore Fuess
Ashburnham	Cushing Academy	Clarence R. Quinby
Belmont	Belmont Hill School	Thomas R. Morse
Boston	Boston Academy of Notre Dame	Sister Teresa
Boston	The Brimmer & May School	Catherine McCoy
Boston	Chauncy Hall School	Franklin T. Kurt
Boston	Erskine School	Edith A. Richardson
Boston	Huntington School for Boys	Charles H. Sampson
Boston	The Winsor School	Frances Dorwin Dugan
Brookline	Choate School	Augusta Choate
Brookline	The Rivers Country Day School	Clarence E. Allen
Cambridge	The Browne & Nichols School	Warren C. Seyfert
Cambridge	The Buckingham School	Marian W. Vaillant
Cambridge	Manter Hall School	J. C. Hall
Cambridge	The New Preparatory School	Ernest Benshimol
Chestnut Hill	The Beaver Country Day School	Eugene R. Smith
Concord	Concord Academy	J. Josephine Tucker
Concord	Middlesex School	Lawrence Terry
Danvers	St. John's Preparatory School	Brother Aloysius
Dedham	Noble & Greenough School	Charles Wiggins, II
Deerfield	Deerfield Academy	Frank L. Boyden
Easthampton	Williston Academy	Archibald V. Galbraith
East Northfield	Northfield Seminary	Mira B. Wilson
Franklin	Dean Academy	Earle S. Wallace
Groton	Groton School	John Crocker
Groton	Lawrence Academy	Fred Clifton Gray
Hingham	Derby Academy	H. M. Davis, Jr.
Kendall Green	The Cambridge School, Inc.	John R. P. French
Lowell	Rogers Hall	Katharine W. McGay
Marion	Tabor Academy	Walter H. Lillard
Milton	Milton Academy	Wm. L. W. Field
Mt. Hermon	Mount Hermon School	David R. Porter
Natick	Walnut Hill School	Hester R. Davies
Newton	The Country Day School of the Sacred Heart	Rev. Mother M. T. Hill
North Andover	Brooks School	Frank D. Ashburn
Norton	House in the Pines	Mrs. G. C. Milliken
Pittsfield	Miss Hall's School	Margaret H. Hall
Sheffield	Berkshire School	Seaver B. Buck
Southborough	St. Mark's School	Francis Parkman
South Braintree	Thayer Academy	Stacy B. Southworth
South Byfield	Governor Dummer Academy	Edward W. Eames
Springfield	The MacDuffie School	Ralph D. Rutenber, Jr.
Wellesley	Academy of the Assumption	Sister Maria Stella
Wellesley	Dana Hall Schools	Helen Temple Cooke
West Bridgewater	Howard Seminary	Warren R. Sargent
Weston	The Cambridge School	John R. P. French
West Roxbury	The Roxbury Latin School	George N. Northrop
Wilbraham	Wilbraham Academy	Charles L. Stevens
Worcester	Bancroft School	Bradford M. Kingman
Worcester	Worcester Academy	Harold H. Wade

Michigan

City	Institution	Head
Bloomfield Hills	Cranbrook School	R. D. Lindquist
Bloomfield Hills	Kingswood School Cranbrook	Margaret A. Augur
Detroit	Detroit University School	C. O. Page
Detroit	The Liggett School	Katharine Ogden
Detroit	Miss Newman's School	Mary Newman

Minnesota

City	Institution	Head
Duluth	Stanbrook Hall	Sister M. Mary
Faribault	St. Mary's Hall	Margaret Robertson
Faribault	Shattuck School	Donald Henning
Hopkins	The Blake School	Eugene C. Alder
Minneapolis	Minnehaha Academy	E. O. Franklin
Minneapolis	Northrop Collegiate School	Ethel M. Spurr
Owatonna	Pillsbury Academy	G. R. Strayer
St. Paul	St. Paul Academy	John DeQ. Briggs
St. Paul	The Summit School	Sarah Converse

Mississippi

City	Institution	Head
Blue Mountain	Mississippi Heights Academy	J. E. Brown
Gulfport	Gulf Coast Military Academy	Nat Owen
Port Gibson	Chamberlain-Hunt Academy	J. W. Kennedy

Missouri

City	Institution	Head
Boonville	Kemper Military School	A. M. Hitch
Clayton	John Burroughs School	Leonard D. Haertter
Clayton	Chaminade College Academy	Valentine B. Braun
Columbia	University of Missouri Laboratory School	L. G. Townsend

City	Institution	Head
Kansas City	Barstow School	Winifred H. Turner
Kansas City	Pembroke-Country Day School	Howard E. A. Jones
Kansas City	Sunset Hill School	Mrs. Orville C. Green
Lexington	Wentworth Military Academy	L. H. Ungles
Mexico	Missouri Military Academy	C. R. Stribling
Point Lookout	The School of the Ozarks	R. M. Good
St. Louis	Mary Institute	
St. Louis	The Principia	William E. Morgan
St. Louis	St. Louis Country Day School	Robert H. B. Thompson

Nebraska

City	Institution	Head
Omaha	Brownell Hall	Marguerite H. Wickenden
Omaha	Pratt School of Individual Instruction	Mrs. C. F. Pratt

New Hampshire

City	Institution	Head
Andover	Proctor Academy	J. Halsey Gulick
Center Strafford	Austin-Cate Academy	Edmond J. Houle
Concord	St. Paul's School	Norman B. Nash
Derry	Pinkerton Academy	Stanley W. Wright
Exeter	Phillips Exeter Academy	Lewis Perry
Exeter	Robinson Seminary	James A. Pirnie
Kingston	Sanborn Seminary	Raymond A. Hoyt
Meriden	Kimball Union Academy	William R. Brewster
New Hampton	New Hampton	Frederick Smith
Wolfeboro	Brewster Free Academy	Walter G. Grennall, Jr.

New Jersey

City	Institution	Head
Blairstown	Blair Academy	Charles H. Breed
Bordentown	Bordentown Military Institute	H. M. Smith, J. H. Lucas, & D. Styer
Burlington	St. Mary's Hall	Florence Lukens Newbold
Convent	Academy of St. Elizabeth	Sister Marie Josephine
Elizabeth	Pingry School	E. Laurence Springer
Elizabeth	The Vail-Deane School	Eleanor Denison
Englewood	Dwight School	Frances Leggett, Maud J. Hulst
Essex Falls	Kingsley School	Paul C. McPherson
Gladstone	St. Bernard's School	H. D. Nicholls
Hightstown	Peddie School	Wilbour E. Saunders
Hoboken	Stevens Hoboken Academy	B. F. Carter
Jersey City	Bergen School for Girls	Catalina Van Cleef
Lakewood	The Newman School	Paul G. deRosay
Lawrenceville	The Lawrenceville School	Allan V. Heely
Montclair	The Kimberley School	Mrs. Carleton D. Mason
Montclair	Montclair Academy	Walter D. Head
Moorestown	Moorestown Friends School	Chester L. Reagan
Morristown	Morristown School	Earl N. Evans
Newark	Newark Academy	H. Paul Abbott
Newark	Newark Preparatory School	Leon Terry
Newark	Prospect Hill Country Day School	Albert A. Hamblon
New Brunswick	Rutgers Preparatory School	Stanley Shepard, Jr.
Orange	Miss Beard's School, Inc.	Lucie C. Beard and Sara C. Turner
Pennington	Pennington School	Francis Harvey Green
Pine Beach	Admiral Farragut Academy	Earle R. Closson
Plainfield	The Hartridge School, Inc.	Frances A. Hurrey
Plainfield	Wardlaw School	C. D. Wardlaw
Princeton	Miss Fine's School	Elizabeth Dorwart, Acting Head
Princeton	Hun School	John G. Hun
Summit	Kent Place School	Harriet L. Hunt
West Orange	Carteret School for Boys	Eugene M. Hinton

New Mexico

City	Institution	Head
Roswell	New Mexico Military Institute	D. C. Pearson

New York

City	Institution	Head
Albany	Academy of the Holy Names	Sister Mary Isabella
Albany	The Albany Academy	Harold T. Stetson
Albany	Albany Academy for Girls	Rhoda Harris
Albany	St. Agnes School	Blanche Pittman
Bronxville	Brantwood Hall School	Mrs. Lewis S. Latimer
Brooklyn	Adelphi Academy	William Slater
Brooklyn	Berkeley Institute	Ina C. Atwood
Brooklyn	Brooklyn Academy	Chas. W. Cortright
Brooklyn	Brooklyn Friends School	Douglas G. Grafflin
Brooklyn	Brooklyn Preparatory School	John H. Klocke
Brooklyn	Colby Academy	Walter S. Meyer
Brooklyn	Polytechnic Preparatory Country Day School	Joseph Dana Allen
Buffalo	The Buffalo Seminary	L. Gertrude Angell
Buffalo	The Franklin School	Janet Crawford
Buffalo	The Nichols School of Buffalo	Philip M. B. Boocock
Carmel	Drew Seminary for Young Women	Herbert E. Wright
Cooperstown	Knox School	Mrs. Russell Houghton
Cornwall	New York Military Academy	Frank A. Patillo
Flushing	The Foxwood School	Mrs. Elizabeth C. Dresser
Forest Hills	Kew-Forest School	James L. Dixon
Garden City	Cathedral School of St. Mary	Marion B. Reid
Garden City	St. Paul's School	Walter R. Marsh
Jackson Heights	Garden Country Day School	O. P. Flower
Lake Placid Club	Northwood School	Ira A. Flinner
Lima	Genesee Wesleyan Seminary	J. Wesley Searles, Acting
Locust Valley	Friends Academy	Harold A. Nomer
Manlius	The Manlius School	Norman S. Waldron
Montour Falls	Cook Academy	Paul J. Gelinas
New Hartford	Utica Country Day School	Florence L. Robinson
New York	Academy of Mount Saint Vincent	Sister Mary Angelica
New York	All Hallows Institute	Brother C. S. McManus
New York	Barnard School for Boys	William L. Hazen
New York	Barnard School for Girls	Margaret D. Gillette
New York	Bentley School	Bertha M. Bentley
New York	Birch Wathen School	Louise Birch
New York	The Brearley School, Ltd.	Mrs. Rustin McIntosh
New York	The Calhoun School	Mary E. Calhoun, Elia C. Levis
New York	The Chapin School, Ltd.	Ethel G. Stringfellow
New York	Collegiate School	Wilson Parkhill
New York	Columbia Grammar School	Frederic A. Alden
New York	Corpus Christi School	George Fox
New York	The Dalton School	Helen Parkhurst
New York	Ethical Culture Schools	V. T. Thayer
New York	Franklin School	David P. Berenberg, Clifford W. Hall
New York	Friends Seminary	S. Archibald Smith
New York	The Gardner School, Inc.	M. Elizabeth Masland
New York	The Lenox School	Olivia Green
New York	Lincoln School	John R. Clark, Acting
New York	Horace Mann School	Rollo G. Reynolds
New York	Horace Mann School for Boys	Charles C. Tillinghast
New York	McBurney School	Thomas Hemenway
New York	New York Preparatory School	Ernest Greenwood
New York	Rhodes School	David Goodman
New York	The Riverside School, Inc.	Margaret E. Wells
New York	St. Ann's Academy	Brother Paul Wilfrid
New York	The Scudder School	James E. Lough
New York	Spence School	Mrs. Harold S. Osborne
New York	Trinity School	Matthew E. Dann
New York	Walden School	Hannah Falk
Niagara Falls	DeVeaux School	George L. Barton, Jr.
Oakdale	La Salle Military Academy	Brother Brendan
Pawling	The Pawling School	R. J. Shortlidge
Peekskill	Peekskill Military Academy	John C. Bucher
Peekskill	St. Mary's School	Sister Mary Regina
Poughkeepsie	Oakwood School	William J. Reagan
Riverdale	Riverdale Country School	Frank S. Hackett
Rochester	Allendale School	John R. Webster
Rochester	Columbia School	Della E. Simpson
Rochester	The Harley School	Louise M. Sumner
Rye	Rye Country Day School	Morton Snyder
Scarborough	Scarborough School	F. Dean McClusky
Schenectady	The Brown School	Amy Kermeth
Snyder	The Park School of Buffalo	M. Adolphus Cheek, Jr.
Staten Island	Notre Dame Academy	Mother St. Mary Catharine
Staten Island	Staten Island Academy	Stephen J. Botsford
Stony Brook	The Stony Brook School	Frank E. Gaebelein
Syracuse	Goodyear-Burlingame School	Marion S. Edwards
Tarrytown	The Hackley School	Mitchell Gratwick
Tarrytown	Highland Manor School	Eugene H. Lehman
Tarrytown	Irving School	C. W. Olson
Tarrytown	Marymount School	Mother M. St. Clare
Troy	Emma Willard School	Eliza Kellas
Troy	La Salle Institute	Brother Patrick
Woodmere	Woodmere Academy	Horace M. Perry

City	Institution	Head

North Carolina

City	Institution	Head
Asheville	Asheville School	David R. Fall
Asheville	St. Genevieve-of-the-Pines	Mother A. Foret
Buie's Creek	Campbell College	L. H. Campbell
Hendersonville	Fassifern School	Joseph R. Sevier
Oak Ridge	Oak Ridge Military Institute	T. O. Wright
Raleigh	St. Mary's School	A. W. Tucker
Winston Salem	Salem Academy	Mary A. Weaver

North Dakota

City	Institution	Head
Fargo	Oak Grove Seminary	T. H. Quanbeck

Ohio

City	Institution	Head
Akron	Old Trail School	Philip S. Sayles
Barnesville	Friends Boarding School	Blanche E. Schofield
Cincinnati	College Preparatory School	Ruth R. Jones
Cincinnati	Hillsdale School	Miss Florence E. Fessenden
Cincinnati	University School	Raymond B. Johnson
Cleveland	Hathaway-Brown School	Anne Cutter Coburn
Cleveland	Laurel School	Edna F. Lake
Cleveland	University School	Harry A. Peters
Columbus	Columbus Academy	Charles H. Jones
Columbus	Columbus School for Girls	Samuel Shellabarger
Hudson	Western Reserve Academy	Joel B. Hayden
Maumee	Maumee Valley Country Day School	Willis W. Stork
Mt. St. Joseph	Mt. St. Joseph Academy	Sister Dorothea
Mt. Vernon	Mt. Vernon Academy	C. C. Morris
Reading	Mount Notre Dame Academy	Sister Eleanor Josephine

Oregon

City	Institution	Head
Gaston	Laurelwood Academy	G. H. Simpson
Portland	The Catlin School	Mrs. J. T. Powers
Portland	Hill Military Academy	Joseph A. Hill
Portland	St. Helen's Hall	Sister W. Lucia

Pennsylvania

City	Institution	Head
Birmingham	The Grier School	Thomas C. Grier
Bryn Mawr	The Baldwin School	Rosamond Cross
Bryn Mawr	The Shipley School	Alice G. Howland and Eleanor O. Brownell
Forty Fort	The Wilkes-Barre Day School	Harold L. Cruikshank
George School	George School	George A. Walton
Harrisburg	The Harrisburg Academy and Junior Academy	Frank C. Baldwin
Haverford	Haverford School	Cornelius B. Boocock
Hollidaysburg	Highland Hall	Elizabeth G. Baldwin
Kingston	Wyoming Seminary	Wilbur H. Fleck
Lancaster	Franklin & Marshall Academy	E. M. Hartman
Lancaster	The Shippen School	Eleanor Fitzpatrick
Latrobe	St. Xavier Academy	Sister M. Fabian
Mercersburg	The Mercersburg Academy	Charles S. Tippets
New Bloomfield	Carson Long Institute	Edward L. Holman
Newtown Square	The Ellis College Square	Arnold E. Look
Overbrook	The Episcopal Academy	Greville G. Haslam
Overbrook	Friends Central School	Barclay L. Jones
Pennsburg	Perkiomen School	Clarence E. Tobias, Jr.
Philadelphia	Academy of the Sacred Heart	Mother H. Moclair
Philadelphia	Brown Preparatory School	A. Linn Myers
Philadelphia	Carson College for Orphan Girls	Elsa Ueland
Philadelphia	Chestnut Hill Academy	Charles Platt, Jr.
Philadelphia	Friends' Select School	Harris G. Haviland
Philadelphia	Germantown Academy	Samuel E. Osbourn
Philadelphia	Germantown Friends School	Burton H. Price
Philadelphia	Lankenau School for Girls	E. F. Bachmann
Philadelphia	Mount St. Joseph Academy	Mother Denis Marie
Philadelphia	Oak Lane Country Day School	George H. Ivins
Philadelphia	William Penn Charter School	John F. Gummere
Philadelphia	Springside School	Mrs. Samuel H. Paul
Philadelphia	The Stevens School	Mrs. Mildred W. Swan
Philadelphia	Temple University High School	H. E. Harting
Pittsburgh	Arnold School	
Pittsburgh	The Ellis School	Harriet Sheldon
Pittsburgh	Shady Side Academy	E. W. Cole
Pittsburgh	The University School	Guy H. Baskerville
Pittsburgh	The Winchester-Thurston School	Mary A. G. Mitchell
Pottstown	The Hill School	James I. Wendell
Saltsburg	Kiskiminetas Springs School	John J. Daub
Susquehanna	Laurel Hill Academy	J. R. Ibolsh
Washington	Washington Seminary	Mrs. Ezra Kempton Maxfield
Wayne	Valley Forge Military Academy	Milton G. Baker
Westtown	Westtown School	James F. Walker
Wynnewood	The Agnes Irwin School	Bertha M. Laws
Wynnewood	Montgomery School	Gibson Bell
York	York Collegiate Institute	Lester F. Johnson

Rhode Island

City	Institution	Head
East Greenwich	East Greenwich Academy	T. Arthur Mosley
Newport	St. George's School	J. Vaughan Merrick
Portsmouth	Portsmouth Priory School	J. Hugh Diman
Providence	Lincoln School	Marion S. Cole
Providence	The Mary C. Wheeler School	Mabel Van Norman
Providence	Moses Brown School	L. Ralston Thomas

South Carolina

City	Institution	Head
Aiken	Fermata School	
Bamberg	Carlisle School	James F. Risher
Charleston	Ashley Hall	Mary V. McBee

Tennessee

City	Institution	Head
Baxter	Baxter Seminary	Harry L. Upperman
Bell Buckle	Webb School	W. R. Webb
Butler	Watauga Academy	C. A. Todd
Chattanooga	Baylor School	Herbert B. Barks
Chattanooga	Girls' Preparatory School	Tommie P. Duffy
Chattanooga	The McCallie School	S. J. & J. P. McCallie
Columbia	Columbia Military Academy	C. A. Ragsdale
Franklin	Battle Ground Academy	George I. Briggs
Memphis	Miss Hutchison's School	Mary G. Hutchison
Nashville	Peabody Demonstration School	J. E. Windrow
Petersburg	The Morgan School	R. Kenneth Morgan, Jr.
Pleasant Hill	Pleasant Hill Academy	Victor Obenhaus
Sewanee	Sewanee Military Academy	C. A. Fasick
Sweetwater	Tennessee Military Institute	D. N. McQuiddy

Texas

City	Institution	Head
Bryan	Allen Academy	H. Brownlee
Dallas	Hockaday School	Ela Hockaday
Dallas	Terrill Preparatory School and Junior College	S. M. Davis
El Paso	Radford School for Girls	Lucinda deL. Templin
Houston	Kinkaid School	Mrs. W. J. Kinkaid
Houston	St. Thomas College High School	A. L. Higgins
Laredo	Holding Institute	Anton Deschner
San Antonio	Saint Mary's Hall	Katharine Lee
San Antonio	Peacock Military Academy	Wesley Peacock, Jr.
San Antonio	Texas Military Institute	W. W. Bondurant
San Marcos	San Marcos Academy	R. M. Cavness

Utah

City	Institution	Head
Salt Lake City	Rowland Hall School for Girls	Fanny B. Jones, Acting

Vermont

City	Institution	Head
Lyndon Center	Lyndon Institute	O. D. Mathewson
Manchester	Burr & Burton Seminary	Ralph E. Howes
Putney	Putney School	Carmelita Hinton
St. Johnsbury	St. Johnsbury Academy	Stanley R. Oldham
Saxtons River	Vermont Academy	Laurence G. Leavitt

Virginia

City	Institution	Head
Alexandria	Episcopal High School	A. R. Hoxton
Alexandria	St. Agnes School, Inc.	Helen Arny Macan
Chatham	Chatham Hall	Edmund J. Lee
Chatham	Hargrave Military Academy	Aubrey H. Camden
Danville	Danville Military Institute	Thomas Wilborn
Fork Union	Fork Union Military Academy	J. J. Wicker
Fort Defiance	Augusta Military Academy	Thos. J. Roller
Front Royal	Randolph-Macon Academy	John C. Boggs
Greenway	The Madeira School	Mrs. David L. Wing
Lynchburg	Virginia Episcopal School	Oscar deW. Randolph

City	Institution	Head
Middleburg	Foxcroft School	Charlotte H. Noland
Richmond	The Collegiate School for Girls	Catharine M. Stauffer
Richmond	McGuire's University School	John P. McGuire
Richmond	St. Catherine's School	Mrs. Jeffrey R. Brackett
Richmond	St. Christopher's School	John Page William
Staunton	Staunton Military Academy	E. R. W. McCabe
Staunton	Stuart Hall	Ophelia S. T. Carr
Warrenton	Warrenton Country School	Léa M. Bouligny
Waynesboro	Fishburne Military School	M. H. Hudgins
Woodberry Forest	Woodberry Forest School	J. Carter Walker
Woodstock	Massanutten Academy	Howard J. Benchoff

Washington

City	Institution	Head
Seattle	Helen Bush School	Helen T. Bush
Seattle	Saint Nicholas School	Fanny C. Steele
Tacoma	Annie Wright Seminary	Elizabeth M. Fitch

West Virginia

City	Institution	Head
Lewisburg	Greenbrier Military School	W. A. Richardson

Wisconsin

City	Institution	Head
Delafield	St. John's Military Academy	Roy F. Farrand
Kenosha	Kemper Hall	Mother Mary Ambrose
Lake Geneva	Northwestern Military & Naval Academy	R. P. Davidson
Milwaukee	Milwaukee Country Day School	A. Gledden Santer
Milwaukee	Milwaukee-Downer Seminary	Marjorie French
Milwaukee	Milwaukee University School	Frank S. Spigener
Prairie du Chien	Campion School	T. J. Stemper

Canada

City	Institution	Head
Aurora, Ont.	St. Andrew's College	Kenneth Ketchum
Belleville, Ont.	Albert College	Bert Howard
Kitchener, Ont.	St. Jerome's College	Michael Weiler
Montreal, Que.	Loyola College	E. M. Brown
Montreal, Que.	Lower Canada College	D. S. Penton
Montreal, Que.	Mt. St. Louis College	Brother Merry Alphonse
Sackville, N. B.	Mt. Allison Academy and Commercial College	L. R. Glenn
St. Thomas, Ont.	Alma Junior College	P. S. Dobson
Stanstead, Que.	Stanstead College	E. C. Amaron
Toronto, Ont.	Bishop Strachan School	E. M. Lowe
Toronto, Ont.	Branksome Hall	Edith M. Read
Toronto, Ont.	Havergal College	G. E. Millard
Toronto, Ont.	Loretto Abbey	
Toronto, Ont.	St. Joseph's College School	Sister Maura
Winnipeg, Man.	St. John's College School	W. Burman
Wolfville, N. S.	Horton Academy	E. W. Robinson

Cuba

City	Institution	Head
Havana	Cathedral School	Bessie S. Casas

Hawaii

City	Institution	Head
Honolulu	Kamehameha Schools	Homer F. Barnes

Philippine Islands

City	Institution	Head
Baguio	Brent School	A. H. Richardson

SECTION XV

SUPERINTENDENTS OF SCHOOLS IN PLACES OF 5000 POPULATION AND OVER

In the following list are included all places which are known to have a superintendent of schools and which, according to the 1940 Federal Census, have a population of 5,000 or over. These include incorporated cities, towns, boroughs and villages, unincorporated towns (in New England), and townships classified as urban by the Bureau of the Census. The names of the superintendents have been revised to December, 1941, and in some cases more recently.

References

(a) County superintendent. (b) Parish superintendent. (c) Supervising principal.

Alabama

City	Superintendent
Alexander City	J. M. Pearson
Andalusia	C. L. Martin
Anniston	C. C. Moseley
Bessemer	J. Clyde Orr
Birmingham	C. B. Glenn
Cullman	R. P. Johnston
Decatur	S. E. Alverson
Dothan	Bruce Flurry
Eufaula	T. G. Wilkinson
Fairfield	B. B. Baker
Florence	J. W. Powell
Gadsden	C. A. Donehoo
Greenville	Marvin P. Mantel (a)
Huntsville	W. G. Hamm
Jasper	G. T. Patrick
Lanett	Taylor H. Kirby
Mobile	W. C. Griggs (a)
Montgomery	C. M. Dannelly (a)
Opelika	R. B. Mardre
Phenix City	Lucien P. Stough
Prichard (Address Mobile)	W. C. Griggs (a)
Selma	Walter M. Jackson
Sheffield	C. M. Brewster
Sylacauga	C. S. Crowther
Talladega	E. A. McBride
Tarrant	W. A. Parker
Troy	N. C. Turpen
Tuscaloosa	H. G. Dowling
Tuscumbia	R. E. Thompson

Arizona

City	Superintendent
Bisbee	C. A. Hall
Douglas	J. E. Carlson, Jr.
Flagstaff	John Q. Thomas
Globe	H. E. Stevenson
Mesa	Rulon T. Shepherd (Elementary)
	Harvey L. Taylor (High)
Nogales	A. J. Mitchell
Phoenix	John D. Loper (Elementary)
	E. W. Montgomery (High)
Prescott	D. R. Sheldon
Tucson	Robert D. Morrow
Winslow	R. E. Booth
Yuma	C. W. McGraw (Elementary)
	Laurance T. Rouse (High)

Arkansas

City	Superintendent
Arkadelphia	L. M. Goza
Batesville	O. M. Owens
Blytheville	W. D. McClurkin
Camden	F. W. Whiteside
Conway	B. A. Short
El Dorado	J. I. McClurkin
Fayetteville	Frank S. Root
Forrest City	M. S. Smith, Jr.
Fort Smith	J. W. Ramsey
Helena	J. F. Wahl
Hope	Miss Beryl Henry
Hot Springs	Emmette E. Bratcher
Jonesboro	R. H. Moore
Little Rock	Russell T. Scobee
Malvern	A. B. Wetherington
No. Little Rock	R. A. Cox
Paragould	Rufus D. Haynes
Pine Bluff	H. F. Dial
Russellville	W. E. Phipps
Stuttgart	Harvey H. Haley
Texarkana	W. E. Gann
Van Buren	Virgle Coleman

California

City	Superintendent
Alameda	Wm. G. Paden
Albany	Paul C. Bryan
Alhambra	Geo. E. Bettinger
Anaheim	M. A. Gauer (Elementary)
	Paul H. Demaree (High)
Antioch	George F. Creary
Arcadia	Elmer E. Westerhouse (Elementary)
Azusa	E. F. Hinds (Elementary)
	Floyd S. Hayden (Secondary)
Bakersfield	John L. Compton (Elementary)
	T. L. Nelson (Secondary)
Berkeley	Virgil E. Dickson
Beverly Hills	Merton E. Hill
Brawley	Geo. K. Anderson (Elementary)
	Percy E. Palmer (High)
Burbank	B. F. Enyeart
Burlingame	L. D. Henderson (Elementary)
Calexico	J. W. Lawson
Chico	F. F. Martin
Chula Vista	J. C. Lauderbach (Elementary)
Coalinga	T. A. Ellestad
Colton	J. H. Waldron (Elementary)
	D. H. McIntosh (High)
Compton	Mrs. Ardella B. Tibbey (Elementary)
	O. S. Thompson (Secondary)
Corona	Frank E. Bishop
Coronado	J. Leslie Cutler
Culver City	Glenn A. Riddlebarger (Elementary)
Daly City	R. L. Crane, Jr. (Elementary)
	James Ferguson (High)
El Centro	Guy A. Weakley
Eureka	J. Warren Ayer
Fresno	Homer C. Wilson
Fullerton	R. E. Green (Elementary)
	Frederick T. Chemberlen (Secondary)
Glendale	Willard S. Ford
Grass Valley	Henry R. Spiess
Hanford	C. E. Denham (Elementary)
Hawthorne	Dan T. Williams (Elementary)
Hayward	Robert M. Reid (Elementary)
	H. B. Long (High)
Hermosa Beach	J. Hampton Watts (Elementary)
Inglewood	Robert E. Cralle (Elementary)
	Harold O. Simar (High)
Lodi	Leroy Nichols
Long Beach	K. E. Oberholtzer
Los Angeles	Vierling Kersey
Lynwood	W. R. Fouts (Elementary)
Madera	E. B. Gardner (Elementary)
Manhattan Beach City	Foster A. Begg (Elementary)
Martinez	Forrest V. Routt
Marysville	W. A. Kynoch
Merced	W. M. Smith (Elementary)
	A. W. Meany (High)
Modesto	J. H. Bradley
Monrovia	Dwight M. Lydell (Elementary)
	A. K. Wilson (High)
Montebello	Cecil D. Hardesty
Monterey	J. R. Croad (Elementary)
	J. R. McKillop (High)
Napa	Irene Snow (Elementary)
	H. M. McPherson (Secondary)
National City	Fred M. Tonge (Elementary)
	J. M. McDonald (High)
Oakland	William F. Ewing
Ontario	Bruce Miller (Elementary)
	Gardiner W. Spring (Secondary)
Orange	Don S. Danner (Elementary)
	A. Haven Smith (High)
Oxnard	C. A. Brittell
Pacific Grove	R. H. Down
Palo Alto	Chas. W. Lockwood
Pasadena	J. A. Sexson
Petaluma	David M. Durst
Piedmont	Harry W. Jones
Pittsburg	F. S. Ramsdell
Pomona	Emmett Clark (Elementary)
	Clifton C. Winn (High)
Porterville	Emmet R. Berry (Elementary)
	B. H. Grisemer (High)
Redding	Frank A. Forderhase (Elementary)
	Jackson Price (High)

City	Superintendent
Redlands	John Branigan
Redondo Beach	Harry P. McCandless (Elementary); Aileen S. Hammond (High)
Redwood City	Andrew Spinas (Elementary)
Richmond	W. T. Helms
Riverside	Ira C. Landis
Roseville	W. T. Eich (Elementary); J. W. Hanson (High)
Sacramento	J. R. Overturf
Salinas	R. D. Case
San Anselmo	Wade F. Thomas (Elementary)
San Bernardino	C. L. Suffield
San Bruno	Henry C. Hall, Jr. (Elementary)
San Diego	Will C. Crawford
San Francisco	J. P. Nourse
San Gabriel	Rolland H. Upton (Elementary)
San Jose	W. L. Bachrodt
San Leandro	Andrew J. Cartwright (Elementary)
San Luis Obispo	Charles E. Teach
San Marino	Elmer C. Neher (Elementary)
San Mateo	Albion H. Horrall (Elementary); F. J. McConville (High)
San Rafael	O. R. Hartzell
Santa Ana	Frank A. Henderson
Santa Barbara	Curtis E. Warren
Santa Cruz	Homer H. Cornick
Santa Maria	Robert A. Bruce (Elementary); Andrew P. Hill, Jr. (Secondary)
Santa Monica	Percy R. Davis
Santa Paula	George A. Bond (Elementary); F. M. Eakin (High)
Santa Rosa	Lloyd K. Wood
South Pasadena	Roy E. Simpson
South San Francisco	G. Carl Weller
Stockton	Ansel S. Williams
Tulare	John H. Napier, Jr. (Elementary)
Upland	Harold W. Cook (Elementary)
Vallejo	John R. Alltucker
Ventura	Theodore G. Greider (Elementary); D. R. Henry (Secondary)
Visalia	DeWitt Montgomery
Watsonville	T. S. MacQuiddy
Whittier	Will E. Wiley (Elementary); Marian L. Wilson (High)
Woodland	Edward H. Farr

Colorado

City	Superintendent
Alamosa	G. P. Young
Boulder	G. Derwood Baker
Canon City	L. L. Beahm
Colorado Springs	Earl D. Cline
Denver	Charles E. Greene
Durango	Emory E. Smiley
Englewood	R. D. Jenkins
Fort Collins	Craig P. Minear
Grand Junction	J. Fred Essig
Greeley	Hubert D. Eldridge
La Junta	G. T. Wilson
Longmont	Kent L. Sanborn
Loveland	R. W. Truscott
Pueblo	District No. 1, J. H. Risley; District No. 20, Ray E. Redmond
Sterling	R. R. Knowles
Trinidad	William R. Ross
Walsenburg	S. M. Andrews

Connecticut

City	Superintendent
Ansonia	John J. Stevens
Berlin	M. V. MacLaughlin
Branford	R. E. Pinkham
Bridgeport	John A. Young
Bristol	Karl A. Reiche
Danbury	Walter P. Sweet
Darien	Edward H. Fuller
Derby	Richard T. Tobin
E. Hartford	P. S. Barnes
E. Haven	W. E. Gillis
Enfield	Karl D. Lee
Fairfield	H. M. Jeffords
Farmington (Address Unionville)	E. W. Ellis
Glastonbury	Francis S. Knox
Greenwich	Maynard W. Linn
Griswold	Ernest G. Lake
Groton	S. B. Butler
Hamden	Margaret L. Keefe
Hartford	Fred D. Wish, Jr.
Killingly	Noyes C. Stickney
Manchester	Arthur H. Illing
Meriden	R. N. Brown
Middletown	Fred W. Shearer
Milford	C. W. Maddocks
Naugatuck	H. E. Chittenden
New Britain	C. C. Ring
New Canaan	E. F. Waldron
New Haven	J. A. Fitzgerald
New London	Warren A. Hanson
New Milford	John Pettibone
North Haven (Address Middletown)	Fred W. Shearer
Norwalk	Philip A. Jakob
Norwich	Thomas W. Mahan
Plainfield	J. L. Chapman
Plainville	Ervin E. Trask
Plymouth (Address Terryville)	H. S. Fisher
Putnam	Thomas W. Mahan
Rockville	Philip M. Howe
Seymour	H. L. Adams
Shelton	Harry E. Fowler
Southington	William M. Strong
Stafford	Earl M. Witt
Stamford	Leon C. Staples
Stonington	P. W. Lane
Stratford	Virgil H. Barker
Thompson	Frank M. Buckley
Torrington	John F. Murphy
Vernon	P. M. Howe
Wallingford	Charles E. Elkema
Waterbury	Thomas J. Condon
Watertown	G. C. Swift
West Hartford	Lloyd H. Bugbee
West Haven	Seth G. Haley
Westport	Heath E. White
Wethersfield	Wilson Greer
Willimantic	Egbert A. Case
Windsor	Earle S. Russell
Winsted	L. R. McKusick

Delaware

City	Superintendent
Dover	Byron W. Hartley
Wilmington	

District of Columbia

City	Superintendent
Washington	Frank W. Ballou

Florida

City	Superintendent
Bartow	Frank E. Brigham
Bradenton	Jessie P. Miller (a)
Chattahoochee	C. H. Gray (a)
Clearwater	G. V. Fuguitt (a)
Coral Gables (Address Miami)	J. T. Wilson (a)
Daytona Beach (Address Deland)	G. W. Marks (a)
Deland	G. W. Marks
Fort Lauderdale	Ulric J. Bennett (a)
Fort Myers	Harry F. Hendry (a)
Fort Pierce	N. H. Bullard (a)
Gainesville	Howard W. Bishop (a)
Hollywood (Address Fort Lauderdale)	Ulric J. Bennett (a)
Jacksonville	W. Daniel Boyd (a)
Key West	M. E. Russell (a)
Lake City	R. O. Wiliams
Lakeland (Address Bartow)	Frank E. Brigham (a)
Lake Wales	Frank S. McLaughlin
Lake Worth (Address W. Palm Beach)	John I. Leonard (a)
Marianna	E. T. Denmark
Miami	J. T. Wilson (a)
Miami Beach (Address Miami)	J. T. Wilson (a)
Ocala	Broward Lovell (a)
Orlando	Judson B. Walker (a)
Palatka	L. S. Barstow (a)
Panama City	M. M. Mashburn (a)
Pensacola	A. S. Edwards (a)
Plant City (Address Tampa)	E. L. Robinson (a)
St. Augustine	D. D. Corbett (a)
St. Petersburg (Address Clearwater)	G. V. Fuguitt (a)
Sanford	T. W. Lawton (a)
Sarasota	T. W. Yarbrough (a)
Tallahassee	F. A. Rhodes (a)
Tampa	E. L. Robinson (a)
West Palm Beach	John I. Leonard (a)
Winter Haven (Address Bartow)	Frank E. Brigham (a)

Georgia

City	Superintendent
Albany	J. O. Allen
Americus	S. C. Haddock
Athens	B. M. Grier
Atlanta	W. A. Sutton
Augusta	S. D. Copeland (a)
Bainbridge	E. G. Elcan
Brunswick	R. E. Hood (a)
Carrollton	M. C. Wiley
Cartersville	W. H. Brandon
Cedartown	J. E. Purks
Columbus	Paul M. Munro
Cordele	D. H. Standard
Dalton	W. W. Stancil
Decatur	Lamar Ferguson
Douglas	L. H. Battle
Dublin	S. H. Sherman
East Point	Jere Wells (a)
Elberton	
Fitzgerald	Newton Watkins
Gainesville	C. J. Cheves
Griffin	S. N. Gardner
Hapeville (Address East Point)	Jere Wells (a)
La Grange	B. A. Lancaster
Macon	Mark A. Smith (a)
Marietta	C. A. Keith
Milledgeville	P. N. Bivins (a)
Moultrie	J. L. Yaden
Newnan	Homer Drake
Rome	R. F. Quigg
Savannah	Ormond B. Strong (a)
Statesboro	W. E. McElveen
Thomaston	Sam F. Burke
Thomasville	N. M. Huckabee
Tifton	G. O. Bailey, Jr.
Toccoa	J. B. Cheatham
Valdosta	A. G. Cleveland
Waycross	Ralph Newton

Idaho

City	Superintendent
Boise	Zed L. Foy
Burley	Geo. E. Denman
Caldwell	L. A. Wiliams
Coeur d'Alene	G. O. Phippeny
Idaho Falls	W. W. Christensen
Lewiston	L. L. Carlson
Moscow	Fulton Gale
Nampa	Earl D. Bonham, Acting
Pocatello	E. Norman Vaughn
Twin Falls	A. W. Morgan

Illinois

City	Superintendent
Alton	W. R. Curtis
Arlington Heights	W. Vanderbeek
Argo-Summit	Clarence Barrett

SECTION XV

SUPERINTENDENTS OF SCHOOLS IN PLACES OF 5000 POPULATION AND OVER

In the following list are included all places which are known to have a superintendent of schools and which, according to the 1940 Federal Census, have a population of 5,000 or over. These include incorporated cities, towns, boroughs and villages, unincorporated towns (in New England), and townships classified as urban by the Bureau of the Census. The names of the superintendents have been revised to December, 1941, and in some cases more recently.

References

(a) County superintendent. (b) Parish superintendent. (c) Supervising principal.

Alabama

City	Superintendent
Alexander City	J. M. Pearson
Andalusia	C. L. Martin
Anniston	C. C. Moseley
Bessemer	J. Clyde Orr
Birmingham	C. B. Glenn
Cullman	R. P. Johnston
Decatur	S. E. Alverson
Dothan	Bruce Flurry
Eufaula	T. G. Wilkinson
Fairfield	B. B. Baker
Florence	J. W. Powell
Gadsden	C. A. Donehoo
Greenville	Marvin P. Mantel (a)
Huntsville	W. G. Hamm
Jasper	G. T. Patrick
Lanett	Taylor H. Kirby
Mobile	W. C. Griggs (a)
Montgomery	C. M. Dannelly (a)
Opelika	R. B. Mardre
Phenix City	Lucien P. Stough
Prichard (Address Mobile)	W. C. Griggs (a)
Selma	Walter M. Jackson
Sheffield	C. M. Brewster
Sylacauga	C. S. Crowther
Talladega	E. A. McBride
Tarrant	W. A. Parker
Troy	N. C. Turpen
Tuscaloosa	H. G. Dowling
Tuscumbia	R. E. Thompson

Arizona

City	Superintendent
Bisbee	C. A. Hall
Douglas	J. E. Carlson, Jr.
Flagstaff	John Q. Thomas
Globe	H. E. Stevenson
Mesa	Rulon T. Shepherd (Elementary) Harvey L. Taylor (High)
Nogales	A. J. Mitchell
Phoenix	John D. Loper (Elementary) E. W. Montgomery (High)
Prescott	D. R. Sheldon
Tucson	Robert D. Morrow
Winslow	R. E. Booth
Yuma	C. W. McGraw (Elementary) Laurance T. Rouse (High)

Arkansas

City	Superintendent
Arkadelphia	L. M. Goza
Batesville	O. M. Owens
Blytheville	W. D. McClurkin
Camden	F. W. Whiteside
Conway	B. A. Short
El Dorado	J. I. McClurkin
Fayetteville	Frank S. Root
Forrest City	M. S. Smith, Jr.
Fort Smith	J. W. Ramsey
Helena	J. F. Wahl
Hope	Miss Beryl Henry
Hot Springs	Emmette E. Bratcher
Jonesboro	R. H. Moore
Little Rock	Russell T. Scobee
Malvern	A. B. Wetherington
No. Little Rock	R. A. Cox
Paragould	Rufus D. Haynes
Pine Bluff	H. F. Dial
Russellville	W. E. Phipps
Stuttgart	Harvey H. Haley
Texarkana	W. E. Gann
Van Buren	Virgle Coleman

California

City	Superintendent
Alameda	Wm. G. Paden
Albany	Paul C. Bryan
Alhambra	Geo. E. Bettinger
Anaheim	M. A. Gauer (Elementary) Paul H. Demaree (High)
Antioch	George F. Creary
Arcadia	Elmer E. Westerhouse (Elementary)
Azusa	E. F. Hinds (Elementary) Floyd S. Hayden (Secondary)
Bakersfield	John L. Compton (Elementary) T. L. Nelson (Secondary)
Berkeley	Virgil E. Dickson
Beverly Hills	Merton E. Hill
Brawley	Geo. K. Anderson (Elementary) Percy E. Palmer (High)
Burbank	B. F. Enyeart
Burlingame	L. D. Henderson (Elementary)
Calexico	J. W. Lawson
Chico	F. F. Martin
Chula Vista	J. C. Lauderbach (Elementary)
Coalinga	T. A. Ellestad
Colton	J. H. Waldron (Elementary) D. H. McIntosh (High)
Compton	Mrs. Ardella B. Tibbey (Elementary) O. S. Thompson (Secondary)
Corona	Frank E. Bishop
Coronado	J. Leslie Cutler
Culver City	Glenn A. Riddlebarger (Elementary)
Daly City	R. L. Crane, Jr. (Elementary) James Ferguson (High)
El Centro	Guy A. Weakley
Eureka	J. Warren Ayer
Fresno	Homer C. Wilson
Fullerton	R. E. Green (Elementary) Frederick T. Chemberlen (Secondary)
Glendale	Willard S. Ford
Grass Valley	Henry R. Spiess
Hanford	C. E. Denham (Elementary)
Hawthorne	Dan T. Williams (Elementary)
Hayward	Robert M. Reid (Elementary) H. B. Long (High)
Hermosa Beach	J. Hampton Watts (Elementary)
Inglewood	Robert E. Cralle (Elementary) Harold O. Simar (High)
Lodi	Leroy Nichols
Long Beach	K. E. Oberholtzer
Los Angeles	Vierling Kersey
Lynwood	W. R. Fouts (Elementary)
Madera	E. B. Gardner (Elementary)
Manhattan Beach City	Foster A. Begg (Elementary)
Martinez	Forrest V. Routt
Marysville	W. A. Kynoch
Merced	W. M. Smith (Elementary) A. W. Meany (High)
Modesto	J. H. Bradley
Monrovia	Dwight M. Lydell (Elementary) A. K. Wilson (High)
Montebello	Cecil D. Hardesty
Monterey	J. R. Croad (Elementary) J. R. McKillop (High)
Napa	Irene Snow (Elementary) H. M. McPherson (Secondary)
National City	Fred M. Tonge (Elementary) J. M. McDonald (High)
Oakland	William F. Ewing
Ontario	Bruce Miller (Elementary) Gardiner W. Spring (Secondary)
Orange	Don S. Danner (Elementary) A. Haven Smith (High)
Oxnard	C. A. Brittell
Pacific Grove	R. H. Down
Palo Alto	Chas. W. Lockwood
Pasadena	J. A. Sexson
Petaluma	David M. Durst
Piedmont	Harry W. Jones
Pittsburg	F. S. Ramsdell
Pomona	Emmett Clark (Elementary) Clifton C. Winn (High)
Porterville	Emmet R. Berry (Elementary) B. H. Grisemer (High)
Redding	Frank A. Forderhase (Elementary) Jackson Price (High)

City	Superintendent
Redlands	John Branigan
Redondo Beach	Harry P. McCandless (Elementary)
	Aileen S. Hammond (High)
Redwood City	Andrew Spinas (Elementary)
Richmond	W. T. Helms
Riverside	Ira C. Landis
Roseville	W. T. Eich (Elementary)
	J. W. Hanson (High)
Sacramento	J. R. Overturf
Salinas	R. D. Case
San Anselmo	Wade F. Thomas (Elementary)
San Bernardino	C. L. Suffield
San Bruno	Henry C. Hall, Jr. (Elementary)
San Diego	Will C. Crawford
San Francisco	J. P. Nourse
San Gabriel	Rolland H. Upton (Elementary)
San Jose	W. L. Bachrodt
San Leandro	Andrew J. Cartwright (Elementary)
San Luis Obispo	Charles E. Teach
San Marino	Elmer C. Neher (Elementary)
San Mateo	Albion H. Horrall (Elementary)
	F. J. McConville (High)
San Rafael	O. R. Hartzell
Santa Ana	Frank A. Henderson
Santa Barbara	Curtis E. Warren
Santa Cruz	Homer H. Cornick
Santa Maria	Robert A. Bruce (Elementary)
	Andrew P. Hill, Jr. (Secondary)
Santa Monica	Percy R. Davis
Santa Paula	George A. Bond (Elementary)
	F. M. Eakin (High)
Santa Rosa	Lloyd K. Wood
South Pasadena	Roy E. Simpson
South San Francisco	G. Carl Weller
Stockton	Ansel S. Williams
Tulare	John H. Napier, Jr. (Elementary)
Upland	Harold W. Cook (Elementary)
Vallejo	John R. Alltucker
Ventura	Theodore G. Greider (Elementary)
	D. R. Henry (Secondary)
Visalia	DeWitt Montgomery
Watsonville	T. S. MacQuiddy
Whittier	Will E. Wiley (Elementary)
	Marian L. Wilson (High)
Woodland	Edward H. Farr

Colorado

City	Superintendent
Alamosa	G. P. Young
Boulder	G. Derwood Baker
Canon City	L. L. Beahm
Colorado Springs	Earl D. Cline
Denver	Charles E. Greene
Durango	Emory E. Smiley
Englewood	R. D. Jenkins
Fort Collins	Craig P. Minear
Grand Junction	J. Fred Essig
Greeley	Hubert D. Eldridge
La Junta	G. T. Wilson
Longmont	Kent L. Sanborn
Loveland	R. W. Truscott
Pueblo	District No. 1, J. H. Risley
	District No. 20, Ray E. Redmond
Sterling	R. R. Knowles
Trinidad	William R. Ross
Walsenburg	S. M. Andrews

Connecticut

City	Superintendent
Ansonia	John J. Stevens
Berlin	M. V. MacLaughlin
Branford	R. E. Pinkham
Bridgeport	John A. Young
Bristol	Karl A. Reiche
Danbury	Walter P. Sweet
Darien	Edward H. Fuller
Derby	Richard T. Tobin
E. Hartford	P. S. Barnes
E. Haven	W. E. Gillis
Enfield	Karl D. Lee
Fairfield	H. M. Jeffords
Farmington (Address Unionville)	E. W. Ellis
Glastonbury	Francis S. Knox
Greenwich	Maynard W. Linn
Griswold	Ernest G. Lake
Groton	S. B. Butler
Hamden	Margaret L. Keefe
Hartford	Fred D. Wish, Jr.
Killingly	Noyes C. Stickney
Manchester	Arthur H. Illing
Meriden	R. N. Brown
Middletown	Fred W. Shearer
Milford	C. W. Maddocks
Naugatuck	H. E. Chittenden
New Britain	C. C. Ring
New Canaan	E. F. Waldron
New Haven	J. A. Fitzgerald
New London	Warren A. Hanson
New Milford	John Pettibone
North Haven (Address Middletown)	Fred W. Shearer
Norwalk	Philip A. Jakob
Norwich	Thomas W. Mahan
Plainfield	J. L. Chapman
Plainville	Ervin E. Trask
Plymouth (Address Terryville)	H. S. Fisher
Putnam	Thomas W. Mahan
Rockville	Philip M. Howe
Seymour	H. L. Adams
Shelton	Harry E. Fowler
Southington	William M. Strong
Stafford	Earl M. Witt
Stamford	Leon C. Staples
Stonington	P. W. Lane
Stratford	Virgil H. Barker
Thompson	Frank M. Buckley
Torrington	John F. Murphy
Vernon	P. M. Howe
Wallingford	Charles E. Elkema
Waterbury	Thomas J. Condon
Watertown	G. C. Swift
West Hartford	Lloyd H. Bugbee
West Haven	Seth G. Haley
Westport	Heath E. White
Wethersfield	Wilson Greer
Willimantic	Egbert A. Case
Windsor	Earle S. Russell
Winsted	L. R. McKusick

Delaware

City	Superintendent
Dover	Byron W. Hartley
Wilmington	

District of Columbia

City	Superintendent
Washington	Frank W. Ballou

Florida

City	Superintendent
Bartow	Frank E. Brigham
Bradenton	Jessie P. Miller (a)
Chattahooche	C. H. Gray (a)
Clearwater	G. V. Fuguitt (a)
Coral Gables (Address Miami)	J. T. Wilson (a)
Daytona Beach (Address Deland)	G. W. Marks (a)
Deland	G. W. Marks
Fort Lauderdale	Ulric J. Bennett (a)
Fort Myers	Harry F. Hendry (a)
Fort Pierce	N. H. Bullard (a)
Gainesville	Howard W. Bishop (a)
Hollywood (Address Fort Lauderdale)	Ulric J. Bennett (a)
Jacksonville	W. Daniel Boyd (a)
Key West	M. E. Russell (a)
Lake City	R. O. Wiliams
Lakeland (Address Bartow)	Frank E. Brigham (a)
Lake Wales	Frank S. McLaughlin
Lake Worth (Address W. Palm Beach)	John I. Leonard (a)
Marianna	E. T. Denmark
Miami	J. T. Wilson (a)
Miami Beach (Address Miami)	J. T. Wilson (a)
Ocala	Broward Lovell (a)
Orlando	Judson B. Walker (a)
Palatka	L. S. Barstow (a)
Panama City	M. M. Mashburn (a)
Pensacola	A. S. Edwards (a)
Plant City (Address Tampa)	E. L. Robinson (a)
St. Augustine	D. D. Corbett (a)
St. Petersburg (Address Clearwater)	G. V. Fuguitt (a)
Sanford	T. W. Lawton (a)
Sarasota	T. W. Yarbrough (a)
Tallahassee	F. A. Rhodes (a)
Tampa	E. L. Robinson (a)
West Palm Beach	John I. Leonard (a)
Winter Haven (Address Bartow)	Frank E. Brigham (a)

Georgia

City	Superintendent
Albany	J. O. Allen
Americus	S. C. Haddock
Athens	B. M. Grier
Atlanta	W. A. Sutton
Augusta	S. D. Copeland (a)
Bainbridge	E. G. Elcan
Brunswick	R. E. Hood (a)
Carrollton	M. C. Wiley
Cartersville	W. H. Brandon
Cedartown	J. E. Purks
Columbus	Paul M. Munro
Cordele	D. H. Standard
Dalton	W. W. Stancil
Decatur	Lamar Ferguson
Douglas	L. H. Battle
Dublin	S. H. Sherman
East Point	Jere Wells (a)
Elberton	
Fitzgerald	Newton Watkins
Gainesville	C. J. Cheves
Griffin	S. N. Gardner
Hapeville (Address East Point)	Jere Wells (a)
La Grange	B. A. Lancaster
Macon	Mark A. Smith (a)
Marietta	C. A. Keith
Milledgeville	P. N. Bivins (a)
Moultrie	J. L. Yaden
Newnan	Homer Drake
Rome	R. F. Quigg
Savannah	Ormond B. Strong (a)
Statesboro	W. E. McElveen
Thomaston	Sam F. Burke
Thomasville	N. M. Huckabee
Tifton	G. O. Bailey, Jr.
Toccoa	J. B. Cheatham
Valdosta	A. G. Cleveland
Waycross	Ralph Newton

Idaho

City	Superintendent
Boise	Zed L. Foy
Burley	Geo. E. Denman
Caldwell	L. A. Wiliams
Coeur d'Alene	G. O. Phippeny
Idaho Falls	W. W. Christensen
Lewiston	L. L. Carlson
Moscow	Fulton Gale
Nampa	Earl D. Bonham, Acting
Pocatello	E. Norman Vaughn
Twin Falls	A. W. Morgan

Illinois

City	Superintendent
Alton	W. R. Curtis
Arlington Heights	W. Vanderbeek
Argo-Summit	Clarence Barrett

City	Superintendent
Aurora	K. D. Waldo (East Side) C. E. Larson (West Side)
Batavia	John B. Nelson
Beardstown	W. L. Gard
Belleville	H. V. Calhoun
Bellwood	M. E. Hattenhauer
Belvidere	Floyd E. Brett
Benton	Charles M. Johnson
Berwyn	Ivan C. Nicholas (Dist. No. 98) E. W. Martin (Dist. No. 100)
Bloomington	Paul Gossard
Blue Island	H. A. Perrin
Brookfield	Leon Smaage
Cairo	Leo C. Schultz
Calumet City	Eric E. Brown J. F. Donisage (Dist. No. 156)
Canton	Ben Kietzman
Carbondale	Raymond Hoffner
Centralia	R. V. Jordan
Champaign	V. L. Nickell
Charleston	U. B. Jeffries
Chester	Lowell V. Krutsinger
Chicago	Wm. H. Johnson
Chicago Heights	Ben A. Sylla
Cicero	G. A. Schwebel
Clinton	J. D. McKibben
Collinsville	E. B. Burroughs
Danville	C. E. Vance
Decatur	William Harris
De Kalb	F. W. Phillips
Des Plaines	E. R. Selleck
Dixon	A. H. Lancaster
Downers Grove	George E. DeWolf
Dundee	V. A. Sutfin
Du Quoin	Oren D. McClure
East Moline	Harold M. Sohrbeck
East Peoria	Paul L. Bolin
East St. Louis	D. Walter Potts
Edwardsville	E. L. Alexander
Effingham	Ernest R. Britton
Elgin	O. F. Patterson
Elmhurst	V. L. Beggs
Elmwood Park	George N. Wells
Evanston	J. R. Skiles (Dist. No. 75) David E. Walker (Dist. No. 76)
Flora	Marvin Akers
Forest Park	W. S. Dimmett
Freeport	B. F. Shafer
Galesburg	Richard V. Lindsey
Glencoe	Paul J. Misner
Glen Ellyn	S. A. Denison
Granite City	A. M. Wilson
Harrisburg	Russell Malan
Harvey	C. C. Thompson
Herrin	John R. Creek
Highland Park	R. H. Price (Dist. No. 107) Clark G. Wright (Dist. No. 108)
Hinsdale	Martin B. Travis
Hoopeston	W. R. Lowery
Jacksonville	R. O. Stoops
Johnston City	Earl E. Miller
Joliet	Leonard B. Wheat
Kankakee	Irving Munson
Kewanee	Charles A. Bruner
La Grange	J. E. Pease (Elementary)
Lake Forest	Melvin G. Davis
La Salle	E. G. Miller
Lawrenceville	M. N. Todd
Lincoln	D. F. Nickols
Litchfield	D. Sprouse
Lombard	Elbert E. Harriss
Macomb	P. F. Shafer
Madison	E. W. Heob
Marion	H. O. Belford
Mattoon	H. B. Black
Maywood	Clarence H. Pygman
Melrose Park	
Metropolis	C. J. Ramsay
Moline	C. R. Crakes, Acting
Monmouth	Roy Fetherston
Morris	L. E. Starke
Mount Carmel	R. S. Condrey
Mount Vernon	J. Lester Buford
Murphysboro	Wm. H. Carruthers
Naperville	R. E. Beebe
Normal	Monroe Melton
North Chicago	F. E. De Yoe (Dist. No. 63) R. L. Newenham (Dist. No. 64)
Oak Park	Eugene Youngert
Olney	C. T. Cramer
Ottawa	Claude S. Chappelear
Pana	T. Hamilton Hale
Paris	John R. Moss
Park Ridge	Harry D. Winslow
Pekin	C. B. Smith
Peoria	G. E. Dille
Peru	C. W. Martin
Pontiac	A. F. Speltz
Princeton	Geo. O. Smith
Quincy	R. O. Evans
River Forest	V. M. Rogers
Riverside	L. J. Hauser
Rockford	Selmer H. Berg
Rock Island	Earl H. Hanson
St. Charles	G. E. Thompson
Salem	B. E. Gum
Skokie	R. E. Cotanche (High) O. O. Young (Elementary)
Springfield	R. E. Fildes
Spring Valley	James Nesti
Sterling	James Walton (Dist. No. 11) H. U. Challand (Dist. No. 10)
Streator	H. K. Whittier
Summit	C. B. Barrett
Taylorville	Warren P. Shepherd
Urbana	T. H. Cobb
Venice	J. H. Gore
Vandalia	James F. Hortin
Villa Park	H. E. Hinkel
Waukegan	John S. Clark
West Frankfort	C. A. Waller
Wheaton	K. K. Tibbetts
Wilmette	J. R. Harper
Winnetka	C. W. Washburne
Wood River	G. A. Smith
Woodstock	W. J. Colahan

Indiana

City	Superintendent
Anderson	Arthur Campbell
Auburn	H. L. McKenney
Bedford	H. H. Mourer
Bicknell	Harold Axe
Bloomington	H. E. Binford
Bluffton	L. R. Willey
Brazil	C. P. Keller
Clinton	E. C. Boyd
Columbus	Otto Hughes, Acting
Connersville	E. C. Dodson
Crawfordsville	M. C. Darnall
Decatur	Walter J. Krick
East Chicago	Roy W. Feik
Elkhart	Harold H. Church
Elwood	C. C. Hillis
Evansville	J. Ralph Irons
Fort Wayne	Merle J. Abbett
Frankfort	Waldo E. Wood
Franklin	R. W. Sheek
Gary	Charles D. Lutz
Goshen	Ort L. Walter
Greensburg	Carl Billings
Hammond	L. L. Caldwell
Hartford City	Joseph C. Wagner
Hobart	Harlie Garver
Huntington	Burton Stephans
Indianapolis	DeWitt S. Morgan
Jasper	Edmund H. Denning
Jeffersonville	W. F. Vogel
Kendallville	H. M. Dixon
Kokomo	C. V. Haworth
Lafayette	Morris E. McCarty
La Porte	Wendell R. Godwin
Lebanon	Paul Van Riper
Linton	Ralph E. Wible
Logansport	Reed Groninger
Madison	E. O. Muncie
Marion	Elbert E. Day
Martinsville	J. C. Rice
Michigan City	M. L. Knapp
Mishawaka	P. C. Emmons
Mount Vernon	O. Stoy Hedges
Muncie	H. B. Allman
New Albany	C. B. McLinn
New Castle	R. H. Valentine
Noblesville	Ben H. Watt
Peru	J. P. Crodian
Plymouth	Ray Kuhn
Portland	D. S. Weller
Princeton	G. E. Derbyshire
Richmond	W. G. Bate
Rushville	L. A. Lockwood
Seymour	N. J. Lasher
Shelbyville	W. F. Loper
South Bend	Frank E. Allen
Sullivan	Dale C. Billman
Tell City	N. Dixon
Terre Haute	George C. Carroll
Tipton	D. E. Leist
Valparaiso	Roy B. Julian
Vincennes	V. L. Eikenberry
Wabash	O. J. Neighbours
Warsaw	James M. Leffel
Washington	Clyde Parker
West Lafayette	F. A. Burtsfield
Whiting	W. W. Borden
Winchester	Philip Wesner

Iowa

City	Superintendent
Albia	W. W. Hartzell
Ames	Leonard A. Steger
Atlantic	Marvin T. Nodland
Boone	H. J. Van Ness
Burlington	R. H. Bracewell
Carroll	V. E. Stansbury
Cedar Falls	J. H. Peet
Cedar Rapids	Arthur C. Deamer
Centerville	E. W. Fannon
Chariton	J. R. Cougill
Charles City	P. C. Lapham
Cherokee	J. C. Hoglan
Clinton	M. M. Schell
Council Bluffs	C. L. Crawford
Creston	Burton R. Jones
Davenport	Irvin H. Schmitt
Decorah	Thos. R. Roberts
Des Moines	N. D. McCombs
Dubuque	Jordan L. Larson
Estherville	N. E. Demoney
Fairfield	W. G. Pence
Fort Dodge	Harold J. Williams
Fort Madison	A. I. Tiss
Grinnell	R. A. Hawk
Iowa City	I. A. Opstad
Keokuk	J. C. Wright
Knoxville	M. A. Trabert
Le Mars	Harvey N. Kluckhohn
Marshalltown	W. F. Shirley
Mason City	R. B. Irons
Muscatine	A. A. Johnson
Newton	B. C. Berg
Oelwein	R. D. Noble
Oskaloosa	R. J. Carroll
Ottumwa	Frank W. Douma
Perry	J. S. Vanderlinden
Red Oak	J. R. Inman
Shenandoah	W. Dean McKee
Sioux City	L. W. Feik
Spencer	W. F. Johnson
Storm Lake	A. Everett Ruby
Washington	E. A. Ralston
Waterloo	J. M. Logan (East Side) Charles A. Kittrell (West Side)
Webster City	Burrus E. Beard

Kansas

City	Superintendent
Abilene	W. C. Robinson
Arkansas City	C. E. St. John
Atchison	W. D. Wolfe
Chanute	L. H. Petit
Coffeyville	K. W. McFarland
Concordia	E. B. Allbaugh
Dodge City	A. G. Schroedermeier
El Dorado	J. F. Hughes
Emporia	W. M. Richards
Fort Scott	V. M. Liston
Garden City	J. R. Jones

City	Superintendent
Great Bend	H. C. Scarborough
Hays	Clyde U. Phillips
Hutchinson	J. W. Gowans
Independence	Willard J. Graff
Iola	John A. Fleming
Junction City	Donald A. McConnell
Kansas City	F. L. Schlagle
Lawrence	Clifford D. Dean
Leavenworth	I. J. Bright
Manhattan	W. E. Sheffer
McPherson	R. W. Potwin
Newton	J. B. Heffelfinger
Ottawa	G. H. Marshall
Parsons	Wallace H. Guthridge
Pittsburg	Howard D. McEachen
Pratt	Amos W. Glad
Salina	Chas. E. Hawkes
Topeka	A. J. Stout
Wellington	Claude Kissick
Wichita	L. W. Mayberry
Winfield	Evan E. Evans

Kentucky

City	Superintendent
Ashland	Arville Wheeler
Bellevue	W. H. Marshall
Bowling Green	L. C. Curry
Corbin	G. W. Campbell
Covington	G. O. Swing
Danville	E. F. Birckhead
Dayton	Olin W. Davis
Fort Thomas	D. W. Bridges
Frankfort	C. D. Redding
Glasgow	J. W. Depp
Harlan	L. C. Henderson
Hazard	R. T. Whittinghill
Henderson	Theo. A. Sanford
Hopkinsville	Gladstone Koffman
Jenkins	C. V. Snapp
Lexington	W. T. Rowland
Louisville	Zenos E. Scott
Ludlow	J. S. Brown
Madisonville	Harper Gatton
Mayfield	Charles I. Henry
Maysville	Louis H. C. Laukhuf
Middlesboro	J. W. Bradner
Newport	A. D. Owens
Owensboro	J. L. Foust
Paducah	H. L. Smith
Paris	Lee Kirkpatrick
Princeton	Everett Howton
Richmond	A. L. Lassiter
Somerset	P. H. Hopkins
Winchester	B. B. Hodgkin

Louisiana

City	Superintendent
Abbeville	J. H. Williams
Alexandria	H. M. Wells (b)
Bastrop	E. D. Shaw (b)
Baton Rouge	C. B. Turner (b)
Benton	R. V. Kerr
Bogalusa	M. J. Israel
Clinton	
Crowley	Spencer D. Pollard
Eunice (Address Opelousas)	W. B. Prescott (b)
Gretna	L. W. Higgins (b)
Hammond (Address Amite)	R. W. Russell (b)
Houma	H. L. Bourgeois (b)
Jackson (Address Clinton)	
Jennings	L. L. Kilgore
Lafayette	J. W. Faulk (b)
Lake Charles	Ward Anderson
Minden	J. E. Pitcher (b)
Monroe	T. O. Brown
Morgan City	R. L. Robinson (b)
Natchitoches	E. A. Lee
New Iberia	L. G. Porter (b)
New Orleans	A. J. Tete, Acting, (b)
Opelousas	W. B. Prescott (b)
Plaquemine	L. P. Terrebonne (b)
Ruston	H. L. Campbell
Shreveport	E. W. Jones (b)
Tallulah	Jas. R. Linton
Thibodaux	R. O. Moncla, Acting
West Monroe	T. O. Brown (b)

Maine

City	Superintendent
Auburn	G. R. Gardner
Augusta	Perry F. Shibles
Bangor	Arthur E. Pierce
Bath	John Parker
Belfast	Horatio S. Read
Biddeford	Phillip H. Woodworth
Brewer	H. R. Houston
Brunswick	Leon P. Spinney
Calais	Loring R. Additon
Caribou	James A. Hamlin
Fairfield	W. H. Phinney
Fort Fairfield	William H. Jenkins
Fort Kent	Francis M. Malcolm
Gardiner	A. Raymond Carter
Houlton	George J. Cumming
Kittery	Elmer O. Small
Lewiston	A. A. Woodworth
Millinocket	Earle F. Wingate
Old Town	Joseph A. Leonard
Portland	W. B. Jack
Presque Isle	R. J. Carpenter
Rockland	A. W. Allen
Rumford	L. E. Williams
Saco	Harry C. Hull
Sanford	Perley S. Turner
Skowhegan	Raymond S. Finley
South Portland	George E. Beal
Van Buren	C. L. O'Connell
Waterville	C. E. Glover
Westbrook	Guy V. Sinclair

Maryland

City	Superintendent
Annapolis	George Fox (a)
Baltimore	D. E. Weglein
Cambridge	W. Theodore Boston (a)
Cumberland	Charles L. Kopp (a)
Frederick	E. W. Pruitt (a)
Frostburg (Address Cumberland)	C. L. Kopp (a)
Hagerstown	Benjamin C. Willis (a)
Hyattsville (Address Upper Marlboro)	Nicholas Orem
Salisbury	J. M. Bennett (a)
Tacoma Park (Address Rockville)	Edwin W. Broome (a)

Massachusetts

City	Superintendent
Abington	Derwood A. Newman
Adams	J. F. Farrell
Agawam	B. J. Phelps
Amesbury	Fred C. English
Amherst	L. L. Dudley
Andover	Kenneth L. Sherman
Arlington	Joseph S. Keating
Athol	William A. Spooner
Attleboro	L. A. Fales
Auburn	C. M. Harris
Barnstable	Melvin C. Knight
Belmont	Mark R. Shibles (Acting)
Beverly	Fred H. Pierce, Acting
Billerica	Harold D. Chittim
Boston	Arthur L. Gould
Braintree	C. E. Fisher
Bridgewater	Albert F. Hunt, Jr.
Brockton	John L. Miller
Brookline	E. R. Caverly
Cambridge	M. E. Fitzgerald
Canton	Richard N. Anketell
Chelmsford	G. S. Wright
Chelsea	Leo P. Casey
Chicopee	J. J. Desmond, Jr.
Clinton	T. F. Gibbons
Concord	H. Paul Larrabee
Danvers	I. G. Smith
Dartmouth	Richard D. Tucker
Dedham	Calvin E. Wilcox
Dracut	James C. Riley
Easthampton	Charles A. Mitchell
Easton	G. C. Mann
Everett	F. A. Ashley
Fairhaven	F. M. Gifford
Fall River	H. L. Belisle
Falmouth	Paul Dillingham
Fitchburg	George C. Francis
Foxboro	Chase MacArthur
Framingham	Burr J. Merriam
Franklin	A. W. Hale
Gardner	F. T. Reynolds
Gloucester	E. W. Fellows
Grafton	Robert W. Barclay
Great Barrington	Kenneth Frank Preston
Greenfield	F. W. Porter
Haverhill	A. I. Clow
Hingham	O. K. Collins
Holyoke	W. R. Peck
Hudson	E. J. Harriman
Ipswich	Harry S. Merson
Lawrence	Dennis E. Callahan
Leominster	Wm. B. Appleton
Lexington	T. S. Grindle
Longmeadow	Ballard D. Remy
Lowell	V. M. McCartin
Ludlow	P. R. Baird
Lynn	H. S. Gruver
Malden	F. G. Marshall
Mansfield	Bert L. Merrill
Marblehead	James W. Vose
Marlboro	E. P. Carr
Maynard	Donald A. Lent
Medford	J. S. Kadesch
Melrose	H. H. Stuart
Methuen	L. H. Conant
Middleboro	J. S. Cushing
Milford	Frank C. Berry
Millbury	William D. Shea
Milton	H. F. Turner
Monson	Jesse M. Morgan
Montague	Arthur E. Burke
Natick	C. R. Hall
Needham	Harry A. Brown
New Bedford	A. P. Keith
Newburyport	Frank Sweeney
Newton	Julius E. Warren
North Adams	Justin W. Barrett
Northampton	William R. Barry
North Andover	F. E. Pitkin
North Attleboro	G. W. Morris
Northbridge (Address Whitinsville)	H. J. Phipps
Norwood	Lincoln D. Lynch
Orange	Edward C. Hempel
Palmer	C. H. Hobson
Peabody	Wm. A. Welch
Pittsfield	Edward J. Russell
Plymouth	Burr F. Jones
Quincy	J. N. Muir
Randolph	A. O. Christiansen
Reading	E. C. Grover
Revere	C. F. Lindstol
Rockland	R. S. Esten
Salem	G. M. Bemis
Saugus	Vernon W. Evans
Shrewsbury	M. A. Sturtevant
Somerset	H. F. Bates
Somerville	E. W. Ireland
Southbridge	Channing H. Greene
South Hadley	Albert T. Patty
Spencer	I. H. Agard
Springfield	John E. Granrud
Stoneham	C. E. Varney
Stoughton	Warren B. Lyman
Swampscott	Frank L. Mansur
Taunton	W. A. Mowry
Tewksbury (Address Wilmington)	S. G. Bean
Uxbridge	A. B. Garcelon
Wakefield	W. B. Atwell
Walpole	A. O. Jones
Waltham	W. H. Slayton
Ware	M. Leroy Greenfield
Wareham	Parker N. Moulton
Watertown	Francis A. Kelly
Webster	George A. Sellig
Wellesley	Edwin H. Miner
Westboro	J. H. Armstrong
Westfield	C. D. Stiles
West Springfield	Franklin P. Hawkes
Weymouth	Charles R. Thibadeau
Whitman	F. E. Holt
Winchendon	Donovan S. Jones
Winchester	J. J. Quinn
Winthrop	Arthur E. Boudreau
Woburn	Daniel P. Hurld
Worcester	W. S. Young

Michigan

City	Superintendent
Adrian	George H. Little
Albion	George Walkotten
Alma	F. R. Phillips
Alpena	Russell H. Wilson
Ann Arbor	O. W. Haisley
Battle Creek	Eldon C. Geyer
Bay City	Benj. Klager
Benton Harbor	S. C. Mitchell
Berkley	M. P. Anderson
Birmingham	Herman I. Shibler
Cadillac	B. C. Shankland
Charlotte	Jay Dykhouse
Cheboygan	Carl Titus
Coldwater	Robert E. Sharer
Dearborn	Ray H. Adams
Detroit	Frank Cody
Dowagiac	James A. Lewis
East Detroit	John N. Kantner
East Lansing	Donald O'Hara
Ecorse	Arthur G. Erickson
Escanaba	John A. Lemmer
Ferndale	E. F. Down
Flint	L. H. Lamb
Grand Haven	E. H. Babcock
Grand Rapids	A. W. Krause
Greenville	Vern E. Mabie
Grosse Pointe	Paul L. Essert
Hamtramck	M. A. Kopka
Hancock	O. M. Vedder
Hastings	D. A. Van Buskirk
Highland Park	W. H. Lemmel
Hillsdale	B. L. Davis
Holland	E. E. Fell
Inkster	Elfrieda Schauer
Ionia	A. A. Rather
Iron Mountain	John Jelsch
Ironwood	Arthur E. Erickson
Ishpeming	C. L. Phelps
Jackson	Harold Steele
Kalamazoo	Loy Norrix
Kingsford (Address Iron Mountain)	Frank C. Sweeney
Lansing	J. W. Sexton
Lapeer	E. E. Irwin
Lincoln Park	Leo W. Huff
Ludington	H. H. Hawley
Manistee	Dorr L. Wilde
Manistique	A. F. Hall
Marquette	W. M. Whitman
Marshall	H. W. Holmes
Menominee	Camden R. Kitson
Midland	J. J. Schafer
Monroe	George T. Cantrick
Mount Clemens	L. W. Fast
Mount Pleasant	Chas. B. Park
Muskegon	John A. Craig
Muskegon Heights	W. R. Booker
Negaunee	H. S. Doolittle
Niles	F. W. Crawford
Owosso	E. J. Willman
Petoskey	H. C. Spitler
Plymouth	Geo. R. Smith
Pontiac	Robert B. French
Port Huron	Howard D. Crull
River Rouge	A. McDonald
Roseville	Glenn Schoenhals
Royal Oak	N. J. Quickstad
Saginaw	C. F. Miller
St. Clair Shores	Murl Momany
St. Joseph	E. B. Holden
Sault Ste. Marie	Foss Elwyn
Sturgis	Paul M. Winger
Three Rivers	Walter Horst
Traverse City	Glenn E. Loomis
Trenton	Jesse L. Anderson
Wyandotte	F. W. Frostic
Ypsilanti	E. H. Chapelle

Minnesota

City	Superintendent
Albert Lea	H. R. Peterson
Alexandria	H. N. Peterson
Anoka	L. W. Adams
Austin	S. T. Neveln
Bemidji	J. W. Smith
Brainerd	G. B. Ferrell
Chisholm	J. P. Vaughan
Cloquet	E. B. Anderson
Columbia Heights	H. C. Nelson
Crookston	L. M. Wikre
Detroit Lakes	C. C. Axvall
Duluth	H. H. Eelkema
Edina (Address Minneapolis)	O. S. Glover
Ely	Stanley Adkins
Eveleth	A. D. Gillett
Fairmont	John J. Skinner
Faribault	C. Willard Cross
Fergus Falls	L. H. Dominick
Hastings	Roy E. Miller
Hibbing	Sydney A. Patchin
International Falls	J. A. Sathrum
Little Falls	James K. Michie
Mankato	J. E. Anderson
Minneapolis	N. B. Schoonmaker (Acting)
Montevideo	C. A. Pederson
Moorhead	S. G. Reinertsen
New Ulm	W. A. Andrews
Owatonna	C. Vinton Burt
Red Wing	L. S. Harbo
Richfield	Arthur H. Johlfs
Robbinsdale	Edwin J. Cooper
Rochester	Irvin E. Rosa
St. Cloud	H. B. Gough
St. Louis Park	N. H. McKay
St. Paul	Paul S. Amidon
St. Peter	Melville R. Davis
South St. Paul	Irvin T. Simley
Stillwater	Guy D. Smith
Thief River Falls	Morris Bye
Virginia	L. A. Lavine
West St. Paul	H. L. Garlough
Willmar	A. M. Wisness
Winona	Harold C. Bauer
Worthington	E. A. Durbahn

Mississippi

City	Superintendent
Biloxi	G. W. Ditto
Brookhaven	C. H. Lipsey
Canton	J. M. Smyth
Clarksdale	H. B. Heidelberg
Columbia	J. O. Snowden
Columbus	C. N. Brandon
Corinth	Hal Anderson
Greenville	F. W. Murphy
Grenada	John Rundle
Greenwood	E. W. Bowlus
Gulfport	B. Frank Brown
Hattiesburg	S. H. Blair
Jackson	K. P. Walker
Laurel	R. H. Watkins
McComb	D. L. Blackwelder
Meridian	H. M. Ivy
Natchez	W. H. Braden
Pascagoula	Thomas R. Wells
Picayune	T. K. Boggan
Tupelo	T. M. Milam
Vicksburg	H. V. Cooper (a)
West Point	B. D. McCallister
Yazoo City	R. J. Koonce

Missouri

City	Superintendent
Boonville	A. L. Crow
Brookfield	John A. Rauh
Cape Girardeau	L. J. Schultz
Carthage	J. L. Campbell
Caruthersville	R. M. Pierce
Chillicothe	E. F. Allison
Charleston	A. D. Simpson
Clayton	John L. Bracken
Clinton	Arthur Lee
Columbia	L. E. Ziegler
De Soto	O. T. Coil
Ferguson	V. C. McCluer
Flat River	Wesley A. Deneke
Fulton	W. Francis English
Hannibal	E. T. Miller
Independence	W. E. Matthews
Jefferson City	Wade C. Fowler
Joplin	E. A. Elliott
Kansas City	Herold C. Hunt
Kennett	O. L. Pierce
Kirksville	J. H. Neville
Kirkwood	F. P. Tillman
Lebanon	Miles A. Eelliff
Lexington	Leslie H. Bell
Maplewood	E. R. Adams
Marshall	Hubert Wheeler
Maryville	H. S. Thomas
Mexico	L. B. Hawthorne
Moberly	M. F. Beach
Neosho	R. W. Anderson
Nevada	Jerry J. Vineyard
Poplar Bluff	G. R. Loughead
Rolla	B. P. Lewis
St. Charles	Stephen Blackhurst
St. Joseph	T. E. Dale
St. Louis	Homer W. Anderson
Sedalia	Heber U. Hunt
Sikeston	R. A. Harper
Springfield	Harry P. Study
Trenton	S. M. Rissler
University City	Charles Banks
Warrensburg	J. S. Maxwell
Washington	C. J. Burger
Webb City	D. R. McDonald
Webster Groves	W. E. Goslin

Montana

City	Superintendent
Anaconda	W. K. Dwyer
Billings	M. C. Gallagher
Bozeman	D. S. Williams
Butte	Lowell W. Johnson
Great Falls	Irving W. Smith
Havre	John Shively
Helena	Payne Templeton
Kalispell	W. D. Swetland
Lewistown	C. G. Manning
Livingston	B. A. Winans
Miles City	W. E. Stegner
Missoula	Ira B. Fee

Nebraska

City	Superintendent
Alliance	H. R. Partridge
Beatrice	E. L. Novotny
Columbus	R. R. McGee
Fairbury	W. E. Scott
Falls City	A. B. Gelwick
Fremont	John G. Hansen
Grand Island	C. Ray Gates
Hastings	A. H. Staley
Kearney	Harry A. Burke
Lincoln	M. C. Lefler
McCook	F. L. Holmes
Nebraska City	Marion R. Shrader
Norfolk	A. P. Burkhardt
North Platte	W. J. Braham
Omaha	H. M. Corning
Scottsbluff	J. E. Shedd
York	Earle W. Wiltse

Nevada

City	Superintendent
Las Vegas	Maude Frazier
Reno	E. Otis Vaughn
Sparks	Procter R. Hug

New Hampshire

City	Superintendent
Berlin	Caleb H. Niles
Claremont	Ernest F. Forbes
Concord	Natt B. Burbank
Derry	Edward I. Erickson
Dover	Gordon L. Fox
Exeter	Clifton A. Towle
Franklin	Fred S. Libbey
Keene	Laurence O. Thompson
Laconia	Clark W. McDermith
Lebanon	W. J. English
Manchester	Austin J. Gibbons
Nashua	Earle T. Tracey
Newport	Alfred W. Smith
Portsmouth	Harry L. Moore
Rochester	Arthur S. Rollins
Somersworth	H. L. Winslow

New Jersey

City	Superintendent
Asbury Park	Maurice Lea Coleman
Atlantic City	Arthur S. Chenoweth
Audubon	William L. Fidler (c)
Bayonne	Howard E. Merity
Belleville	Wayne R. Parmer (c)
Bergenfield	Roy W. Brown (c)
Bloomfield	Henry Hollingsworth
Bogota	Grant W. Leman (c)

City	Superintendent
Boonton	M. Burr Mann
Bound Brook	Albert S. Davis (c)
Bridgeton	Leigh M. Lott
Burlington	Vann H. Smith (c)
Camden	Leon N. Neulen
Carlstadt	Edward F. Krom (c)
Carteret	Wayne T. Branom (c)
Cliffside Park	George F. Hall (c)
Clifton	George J. Smith
Collingswood	Carl M. Diefenbach (c)
Cranford	Howard R. Best (c)
Dover	R. S. Bowlby (c)
Dumont	Charles A. Selzer (c)
Dunellen	Ralph W. Crane (c)
East Orange	Henry E. Kentopp
East Rutherford	Alfred S. Faust (c)
Elizabeth	Ray E. Cheney
Englewood	Winton J. White
Fairlawn	F. H. Brunswick (c)
Fairview	Z. G. Masten (c)
Florence	Jerre F. Moreland
Fort Lee	R. R. Zimmerman (c)
Freehold	Lloyd S. Cassel (c)
Garfield	Joseph F. Moriarty
Glen Ridge	H. W. Dutch (c)
Glen Rock	Kenneth C. Coulter (c)
Gloucester City	Marvin E. Porch
Guttenburg	Mrs. Anna L. Klein (c)
Hackensack	George A. Merrill
Haddonfield	Everett C. Preston (c)
Haddon Heights	William C. Davis (c)
Haledon (Address Paterson)	Herbert H. Husselman
Hammonton	H. H. Smith (c)
Harrison	John P. Murray (c)
Hasbrouck Heights	C. C. Hitchcock (c)
Hawthorne	Stephen W. Moshier (c)
Highland Park	F. W. Furth (c)
Hillside twp.	A. G. Woodfield (c)
Hoboken	Daniel S. Kealey
Irvington	Herschel S. Libby
Jersey City	James A. Nugent
Keyport	John O. Hartzler
Kearny	Edmund L. Tink
Lakewood	Carl M. Bair (c)
Leonia	Nelson C. Smith (c)
Linden	Paul R. Brown
Livingston	Leon O. Fisher
Lodi	Henry V. Matthews (c)
Long Branch	William M. Smith
Lyndhurst	H. P. Shepherd (c)
Madison	Robert C. B. Parker (c)
Manville	John W. Zorella (c)
Metuchen	Elmo E. Spoerl (High) Carl A. Roos (Elementary)
Middletown twp.	Wylie G. Pate
Millburn	John R. Patterson (c)
Millville	G. Edward McComsey
Montclair	A. L. Threlkeld
Moorestown	George C. Baker (c)
Morristown	J. Burton Wiley (c)
Mt. Holly	Ernest L. Saul
Neptune twp. (Address Ocean Grove)	O. J. Moulton (c)
Newark	Stanley H. Rolfe
New Brunswick	Frederick J. Sickles
Newton	Stuart R. Race (c)
North Arlington	W. R. Holbert (c)
North Bergen	R. W. Madden
North Plainfield	Beekman R. Terhune (c)
Nutley	John A. Spargo
Orange	Howard J. McNaughton
Palisades Park	John W. Fuchs (c)
Passaic	Willard B. Spalding
Palmyra	Paul Reese Jones
Paterson	John R. Wilson
Paulsboro	Paul R. Carl (c)
Penns Grove	A. J. Dohner (c)
Pensauken twp. (Address Merchantville)	George B. Fine (c)
Perth Amboy	W. C. McGinnis
Phillipsburg	Clarence V. Sloan
Pitman	L. Arthur Walton (c)
Plainfield	F. W. Cook
Pleasantville	Simon M. Horstick
Princeton	B. Woodhull Davis (c)
Prospect Park	Edmund H. Viemeister (c)
Rahway	Arthur L. Perry
Raritan twp. (Address Perth Amboy, R. #1)	Fred A. Talbot
Red Bank	Edwin C. Gilland (c)
Ridgefield	Raymond F. Currier
Ridgefield Park	A. Ray Palmer (c)
Ridgewood	I. B. Somerville (c)
Riverside	Mrs. Marion B. Rein
Roselle	Joseph L. Bustard (c)
Roselle Park	E. F. Smith (c)
Rutherford	Guy L. Hilleboe (c)
Salem	Halliday R. Jackson
Sayreville	Jesse Selover (c)
Secaucus	M. J. Pechtel (c)
Somerville	T. Latimer Brooks (c)
South Amboy	James F. Tustin
South Orange	John H. Bosshart (c)
South Plainfield	Harry C. Fries (c)
South River	Lester A. Rodes (c)
Summit	W. A. Kincaid
Teaneck	Lester N. Neulen (c)
Tenafly	George A. Kipp (c)
Totowa	Walter S. Twichell, Jr.
Trenton	Paul Loser
Union City	Albert C. Parker
Union twp.	Charles T. Hassard
Ventnor	Mary V. Peters (Elementary)
Verona	C. Vincent Geiger (c)
Vineland	Lawrence R. Winchell (c)
Wallington	Thomas L. Harty (c)
Weehawken	Kenneth F. Woodbury (c)
Westfield	C. A. Philhower (c)
West New York	Harry L. Bain
West Orange	S. C. Strong (c)
Westwood	W. O. Lippitt
Wildwood	Lanning A. Myers
Woodbridge	V. C. Nicklas (c)
Woodbury	Harry L. Stearns
Wood Ridge	Fremont D. Donley (c)

New Mexico

City	Superintendent
Albuquerque	John Milne
Carlsbad	Irvin P. Murphy
Clovis	J. M. Bickley
Gallup	Chas. E. Emery
Hobbs	W. G. Donley
Las Cruces	C. S. Conlee
Las Vegas	W. J. Robertson
Portales	John P. Steiner
Raton	E. E. Harrison
Roswell	J. D. Shinkle
Santa Fe	R. P. Sweeney
Silver City	G. W. Stout
Tucumcari	L. H. Rhodes

New York

City	Superintendent
Albany	Austin R. Coulson
Amityville	Fred B. Paynter
Amsterdam	Heth G. Coons
Auburn	Charles G. Hetherington
Baldwin	Arthur E. Newton
Batavia	Clyde P. Wells
Bay Shore	George H. Gatje
Beacon	E. D. Hewes
Binghamton	Leo J. McEwan
Brighton (Address Rochester)	Aubrey D. Donley
Bronxville	Frederick H. Bair
Buffalo	Robt. T. Bapst
Canandaigua	Arthur E. Warren
Catskill	Maurice S. Hammond
Cedarhurst (Address Lawrence)	Lawrence V. Dodd
Cohoes	James Y. Marra, Acting
Corning	William E. Severn (Dist. No. 9) Hugh W. Gregg (Dist. No. 13)
Cortland	E. G. Simmons
Depew	George R. Crego
Dobbs Ferry	John A. McGinness
Dunkirk	Jerome J. Wheeler
East Aurora	Walter R. Bumgardner
East Rochester	Theodore L. R. Morgan
East Rockaway	Harold F. Studwell
Elmira	Oscar F. Kerlin
Endicott	Herbert H. Crumb
Floral Park	Alvah T. Stanforth (High)
Fredonia	Claude R. Dye
Freeport	John W. Dodd
Fulton	George R. Bodley
Garden City	Frank R. Wassung
Geneva	W. Lynn Houseman
Glen Cove	Eugene J. Gribbin
Glens Falls	Alexander W. Miller
Gloversville	Harry W. Langworthy
Great Neck	Alfred F. Mayhew
Hamburg	W. Howard Vanderhoef
Harrison	Louis M. Klein
Hastings-on-Hudson	John L. Hopkins
Haverstraw	Aloysius J. Lynch
Hempstead	William A. Gore
Herkimer	Henning J. Martin
Hornell	Harrison S. Dodge
Hudson	John T. Kaemmerlen
Hudson Falls	Dana M. King
Huntington	Raymond C. Burdick
Ilion	Earl P. Watkin
Irondequoit	Alfred C. Hamilton (Address Rochester)
Islip	E. B. Robinson
Ithaca	Claude L. Kulp
Jamestown	Clinton V. Bush
Johnson City	Howard B. Eccleston
Johnstown	Erle L. Ackley
Kenmore	Frank C. Densberger
Kingston	Arthur J. Laidlaw
Lackawanna	Leo A. Joyce
Lancaster	Frank L. Smith
Lawrence	Lawrence V. Dodd
Little Falls	Harold L. Corzett
Lockport	Clare N. Pettit
Long Beach	Walter J. Schwalje
Lynbrook	H. Arthur Schubert
Malone	Horace H. Lamberton
Malverne	Howard T. Herber
Mamaroneck	Arthur Z. Boothby
Massena	Martin A. Helfer
Mechanicville	John N. Hayes
Medina	Arthur E. Trippensee
Middletown	Carl V. Warren
Mineola	Harlan B. Allen
Moriah	
Mount Kisco	Harold M. Jennings
Mount Vernon	William H. Martin
Newark	Edwin R. Woelfel
Newburgh	Snyder J. Gage
New Rochelle	Herbert C. Clish
New York (Address Brooklyn)	Harold G. Campbell
Niagara Falls	James F. Taylor
North Tarrytown	Delbert O. Fuller
North Tonawanda	Bernard A. Leonard
Norwich	Gilbert R. Lyon
Nyack	Kenneth R. MacCalman
Ogdensburg	Frank C. Roda
Olean	Donald M. Keagle
Oneida	Albert H. Covell
Oneonta	George J. Dann
Ossining	Harold V. Loomis
Oswego	Charles E. Riley
Owego	Mrs. H. T. Wittemore
Oyster Bay	Leon J. Deming
Patchogue	Paul A. Bassett
Peekskill	J. E. Scott
Penn Yan	Clayton E. Rose
Plattsburg	George M. Elmendorf
Port Chester	Evan E. Jones
Port Jervis	Arthur H. Naylor
Poughkeepsie	Fox D. Holden
Rensselaer	Walter S. Clark
Riverhead	John B. Thomas
Rochester	James M. Spinning
Rockville Center	Floyd B. Watson
Rome	George R. Staley
Rye	A. Verne MacCullough (c)
Salamanca	Richard A. Jensen
Saranac Lake	Howard V. Littell
Saratoga Springs	Harris Crandall
Scarsdale	Vernon G. Smith
Schenectady	W. Howard Pillsbury
Scotia	Basil W. Conrad
Seneca Falls	Frank P. Page
Solvay	Clinton H. Atwood

City	Superintendent
Southold	Lewis A. Blodgett
Syracuse	G. Carl Alverson
Tarrytown	Jesse Leroy Thompson
Tonawanda	James H. Green
Troy	George H. Krug (Union District)
Tuckahoe	Ward I. Miller (Dist. No. 1)
	John C. Goff (Dist. No. 2)
Tupper Lake	Joseph F. Donovan
Utica	A. J. Burdick
Valley Stream	Paul T. Wohlsen
Watertown	Charles E. Sabin
Watervliet	William Richmond
Waverly	Don W. McClelland
Wellsville	George F. Jammer
White Plains	H. Claude Hardy
Yonkers	Wm. Ward Ankenbrand

North Carolina

City	Superintendent
Asheboro	Reginald Turner
Asheville	R. H. Latham
Burlington	L. E. Spikes
Canton	A. J. Hutchins
Charlotte	H. P. Harding
Concord	A. S. Webb
Dunn	G. T. Proffit
Durham	W. F. Warren
Elizabeth City	Paul A. Reid
Fayetteville	Horace Sisk
Forest City (Adress Rutherfordton)	J. J. Tarlton
Gastonia	K. G. Phillips
Goldsboro	Ray Armstrong
Greensboro	B. L. Smith
Greenville	J. H. Rose
Hamlet	H. M. Kyzer
Henderson	E. M. Rollins (a)
Hendersonville	F. M. Waters
Hickory	R. W. Carver
High Point	C. F. Carroll
Kings Mountain	B. N. Barnes
Kinston	W. A. Graham
Laurinburg	L. M. Peele
Lenoir	C. S. Warren
Lexington	L. E. Andrews
Lumberton	J. P. Moore
Monroe	W. R. Kirkman
Mooresville	H. C. Miller
Morganton	W. S. Hamilton
Mount Airy	L. B. Pendergraph
New Bern	H. B. Smith
Newton	R. N. Gurley
Raleigh	Claude F. Gaddy
Reidsville	L. J. Perry
Roanoke Rapids	C. W. Davis
Rocky Mount	R. M. Wilson
Salisbury	J. H. Knox
Shelby	W. E. Abernathy
Statesville	L. S. Weaver
Tarboro	W. A. Mahler
Thomasville	J. N. Hauss
Washington	E. S. Johnson
Wilmington	H. M. Roland (a)
Wilson	S. G. Chappell
Winston-Salem	J. W. Moore

North Dakota

City	Superintendent
Bismarck	H. O. Saxvik
Devils Lake	F. H. Gilliland
Dickinson	A. L. Hagen
Fargo	H. H. Kirk
Grand Forks	Elroy Schroeder
Jamestown	Wm. S. Gussner
Mandan	J. C. Gould
Minot	L. A. White
Valley City	G. W. Hanna
Williston	J. N. Urness

Ohio

City	Superintendent
Akron	Ralph H. Waterhouse
Alliance	B. F. Stanton
Ashland	J. E. Bohn
Ashtabula	E. D. Maurice
Athens	Harper C. Pendry
Barberton	U. L. Light
Barnesville	Silas T. Warfield
Bedford	A. E. Moody
Bellaire	J. V. Nelson
Bellefontaine	S. A. Frampton
Bellevue	W. L. Arnholt
Berea	J. F. Koeppe
Bexley	H. C. Dieterich
Bowling Green	H. L. Bowman
Bryan	L. N. Nicholas
Bucyrus	D. C. Baer
Cambridge	Hugh R. Hick
Campbell	Andrew S. Klinko
Canton	Jesse H. Mason
Chillicothe	M. M. Berry
Cincinnati	C. V. Courter
Circleville	Frank Fischer
Cleveland	Charles H. Lake
Cleveland Heights	Frank L. Wiley
Columbus	Geo. E. Roudebush
Conneaut	Norman Koontz
Coshocton	A. C. Pence
Cuyahoga Falls	Gilbert Roberts
Dayton	Emerson H. Landis
Defiance	N. G. Fawcett
Delaware	Ervin F. Carlisle
Delphos	Robert H. Christy
Dover	C. E. Palmer
East Cleveland	O. J. Korb
East Liverpool	Herbert G. Means
East Palestine	T. R. Hersh
Elyria	R. C. Maston
Euclid	Russell H. Erwine
Findlay	F. L. Kinley
Fostoria	H. L. Ford
Fremont	U. E. Diener
Galion	M. A. Povenmire
Gallipolis	E. E. Higgins
Garfield Heights	Harold R. Maurer
Girard	Wilden J. Moore
Grandview Heights (Columbus P. O.)	W. C. Rohleder
Greenville	C. L. Bailey
Hamilton	Clyde W. White
Ironton	John A. Miller
Jackson	T. K. Owens
Kent	J. W. Spangler
Kenton	L. E. McKinley
Lakewood	Paul A. Rehmus
Lancaster	Paul G. Wenger
Lima	J. McLean Reed
Lockland	J. U. Dungan
Logan	G. E. Carr
Lorain	P. C. Bunn
Mansfield	W. L. Miller
Maple Heights	A. E. Hadfield
Marietta	H. L. Sullivan
Marion	E. E. Holt
Martins Ferry	F. L. Teal
Massillon	L. J. Smith
Miamisburg	Harris V. Bear
Middletown	R. W. Solomon
Mingo Junction	M. L. Dennis
Mount Vernon	J. D. Greiger
Nelsonville	E. J. Arnold
Newark	Paul B. Edwards
New Boston	J. W. Evans
New Philadelphia	H. S. Carroll
Niles	S. J. Bonham
North College Hill	Roy E. Corrill
Norwalk	H. C. Ellis
Norwood	Harold S. Bates
Oakwood (Dayton P. O.)	A. E. Claggett
Painesville	C. C. Pierce
Parma	F. S. Shields
Piqua	G. O. Dietrich
Portsmouth	W. Dennis Perkinson
Ravenna	H. L. Brown
Reading	H. L. Bussey
Rocky River	J. J. Young
St. Bernard	Chas. W. Howell
St. Marys	C. C. McBroom
Salem	E. S. Kerr
Sandusky	Karl Whinnery
Shaker Heights	Arthur K. Loomis
Shelby	C. G. Keck
Sidney	C. C. Crawford
South Euclid	C. R. Dustin
Springfield	H. L. Stevens
Steubenville	Russell E. Schafer
Struthers	H. E. Zuber
Tiffin	Paul V. Brown
Toledo	E. L. Bowsher
Toronto	H. P. Smith
Troy	T. E. Hook
Uhrichsville	H. B. Galbraith
Upper Arlington (Address Columbus)	J. W. Jones
Urbana	R. M. Fosnight
Van Wert	C. D. Fox
Wadsworth	Frank H. Close
Wapakoneta	M. R. Simpson
Warren	H. B. Turner
Washington Court House	A. B. Murray
Wellston	H. L. Holter
Wellsville	S. E. Daw
Wilmington	H. W. Hodson
Wooster	C. M. Layton
Xenia	R. J. Warner
Youngstown	George A. Bowman
Zanesville	Donald F. Summers

Oklahoma

City	Superintendent
Ada	C. D. Proctor
Altus	A. G. Steele
Alva	Chas. E. Hinshaw
Anadarko	R. L. McLean
Ardmore	George D. Hann
Bartlesville	M. W. Glasgow
Blackwell	Harry Huston
Bristow	E. H. Black
Chickasha	Bruce J. Myers
Clinton	Arnett Cross
Cushing	William D. Carr
Duncan	Dion C. Wood
Durant	G. T. Stubbs
Elk City	J. E. Holcomb
El Reno	Paul R. Taylor
Enid	DeWitt Waller
Frederick	W. F. Randle
Guthrie	W. A. Greene
Henryetta	E. E. Battles
Hobart	B. A. McElyea
Holdenville	G. S. Sanders
Hugo	Harvey M. Black
Lawton	B. C. Swinney
McAlester	D. D. Kirkland
Miami	R. C. Nichols
Muskogee	J. R. Holmes
Norman	George M. Roberts
Oklahoma City	H. E. Wrinkle
Okmulgee	W. Max Chambers
Pauls Valley	David E. Phillips
Pawhuska	Ross C. Kendall
Perry	George Spraberry
Picher	W. W. Schultz
Ponca City	C. P. Howell
Sand Springs	Clyde A. Boyd
Sapulpa	James L. Prince
Seminole	John G. Mitchell
Shawnee	A. L. Burks
Stillwater	E. D. Price
Tulsa	H. W. Gowans
Vinita	H. C. Demunbrun
Wewoka	Harry D. Simmons
Woodward	R. R. Russell

Oregon

City	Superintendent
Albany	R. E. McCormack
Astoria	A. C. Hampton
Baker	A. E. Hirschler
Bend	Howard W. George
Corvallis	J. F. Schenk
Eugene	J. F. Cramer
Grants Pass	M. B. Winslow
Klamath Falls	Arnold L. Gralapp
La Grande	Fred J. Patton
Marshfield	Lynn A. Parr
Medford	E. H. Hedrick
Oregon City	J. T. Longfellow
Pendleton	Austin Landreth
Portland	R. E. Dugdale
Salem	Frank B. Bennett
The Dalles	Paul R. McCulloch

Pennsylvania

City	Superintendent
Abington	Joseph C. Weirick
Aliquippa	Lytle M. Wilson
Allentown	Wm. L. Connor
Altoona	Levi Gilbert
Ambridge	J. R. Miller
Archbald	John F. Moran
Arnold	H. L. Holste
Ashland	Harvey S. Bolan
Ashley	Robert C. Metz (c)
Avalon	S. Todd Perley
Bangor	Harry O. Eisenberg
Beaver	G. A. McCormick
Beaver Falls	J. Roy Jackson
Bellefonte	Earl K. Stock
Bellevue	Harry E. Brumbaugh
Bensalem twp. (Address Cornwells Heights)	A. Kurtz King

City	Superintendent
Berwick	M. E. Houck
Bethlehem	William Howard Weiss
Blairsville	N. Montgomery (c)
Blakely Boro. (Address Peckville)	H. B. Anthony
Bloomsburg	L. P. Gilmore (c)
Brackenridge	R. R. Anderson (c)
Braddock	W. C. Evans
Bradford	Floyd C. Fretz
Brentwood	O. H. English (c)
Bridgeport	C. C. Smith
Bristol	Warren P. Snyder
Brownsville	Raymond T. Barner
Butler	Roy W. Wiley
Canonsburg	Clinton A. Mathewson
Carbondale	Mary B. McAndrew
Carlisle	J. W. Potter
Carnegie	Norman L. Glasser
Cecil twp. (Address Canonsburg R.D. 1)	H. S. Kuder
Centerville (Address West Brownsville)	C. H. Lyon (c)
Chambersburg	J. Frank Faust
Charleroi	T. L. Pollock
Cheltenham twp. (Address Elkins Park)	Frank C. Ketler
Chester	F. Herman Fritz
Clairton	H. D. Teal
Clearfield	S. F. W. Morrison
Coaldale	R. B. Harvey (c)
Coal twp. (Address Shamokin)	D. T. Meisberger
Coatesville	H. R. Vanderslice
Collingdale	F. E. Stengle
Columbia	J. B. Kennedy
Conemaugh twp. (Address Davidsville)	G. W. Stephens
Connellsville	William G. Davis
Conshohocken	Robert C. Landis
Coraopolis	G. W. Cassler (c)
Corry	Ralph S. Dewey
Crafton	Denton M. Albright
Danville	E. B. Cline (c)
Darby	W. R. Douthett
Derry twp. (Address Hershey)	J. I. Baugher
Dickson City Boro.	P. M. Brennan
Donora	John E. Shambach
Dormont	David H. Stewart
Du Bois	Herbert E. Reisgen
Dunbar twp. (Address Leisenring)	W. E. Tiethohl
Dunmore	J. R. Gilligan
Dupont (Address Pittston)	John Andruchick
Duquesne	Fred C. Gillespie
Duryea	J. J. Joyce (c)
Easton	James C. Bay
East Pittsburgh	Charles F. Young
East Stroudsburg	Carl T. Secor (c)
Edwardsville (Address Kingston)	V. E. Lewis (c)
Ellwood City	J. Ellis Bell
Emmaus	H. J. Yeager
Ephrata	C. F. Hartzler
Erie	C. Herman Grose
Etna	Clayton L. McMillen
Exeter	John B. Campbell (c)
Farrell	Carroll D. Kearns
Fell twp. (Address Carbondale)	John H. Campbell
Ford City	Quincey G. Vincent
Forest Hills	D. Paul Jones
Forty Fort	Frank W. Walp (c)
Frackville	Wm. R. Trautman (c)
Franklin	Karl M. Russell
Freeland	N. P. Luckenbill (c)
German twp. (Address McClellandtown)	J. Carman Newcomer
Gettysburg	L. C. Keefauver
Glassport	M. J. Naser (c)
Greensburg	Samuel B. Bulick
Greenville	A. Bruce Denniston
Grove City	H. W. Traister
Hanover	Robert A. Bagshaw

City	Superintendent
Hanover twp. (Address Wilkes Barre)	E. S. Williams
Harrisburg	R. R. Abernethy
Haverford twp. (Address Upper Darby)	J. Frank Carter
Hazle twp. (Address Hazleton)	Joseph D. Gallagher
Hazleton	Thomas L. Hinkle
Hollidaysburg	J. L. Hackenberg
Homestead	Port Eckles
Honesdale	J. J. Koehler
Huntingdon	J. G. Everard
Indiana	E. C. Perry
Jeannette	Foster B. Snowden
Jenkintown	Regina W. Bell
Jersey Shore	Charles W. Potter (c)
Johnstown	J. Ernest Wagner
Kane	Glennis H. Rickert
Kingston	Bela B. Smith
Kittanning	Clyde W. Cranmer
Kulpmont	J. A. Shovlin (c)
Lancaster	Harvey A. Smith
Lansdale	Ralph R. Smith
Lansdowne	Garmon Ross, Acting
Lansford	John E. Lauer
Larksville (Address Wilkes Barre)	Thomas F. Feeney
Latrobe	John G. Hulton
Lebanon	John W. Hedge
Lehighton	Bert B. David
Lewistown	C. V. Erdly
Lock Haven	J. F. Puderbaugh
Lower Merion twp. (Address Ardmore)	Frank A. Dubois
Luzerne	T. Stuart Williams (c)
Mahanoy City	Joseph E. Doyle
Mauch Chunk twp. (Address Nesquehoning)	Clayton W. Wotring
McAdoo	Sallie L. Ferry (c)
McKeesport	James H. Lawson
McKees Rocks	W. H. Church
Meadville	Warren P. Norton
Mechanicsburg	E. B. Long
Media	Wm. H. Michaels (c)
Middletown	G. W. Feaser
Midland	W. S. Bazard
Millvale	V. C. Holsinger (c)
Milton	Carl L. Millward
Minersville	Edward A. Brady
Monaca	Philip H. Petrie
Monessen	A. John Goetz
Monongahela	John H. Dorr
Morrisville	M. R. Reiter
Mount Carmel	G. A. Beierschmitt
Mt. Carmel twp. (Address Locust Gap)	P. J. Burke
Mount Lebanon twp. (Address Pittsburgh 16)	H. V. Herlinger
Mount Oliver	A. D. Cleland (c)
Mount Pleasant	J. C. Haberlen
Mount Pleasant twp. (Address Mt. Pleasant)	Lloyd F. Rumbaugh
Muhlenberg twp. (Address Temple)	C. E. Cole
Munhall	Earle O. Liggitt
Nanticoke	J. Fred Jones
Nanty-Glo	C. H. Bowers
Narberth	W. J. Drennan
Nazareth	F. A. Marcks
New Brighton	S. W. Lyons
New Castle	Clyde C. Green
New Kensington	E. T. Chapman
Newport twp. (Address Wanamie)	Andrew E. Rushin
Norristown	H. O. Dietrich
Northampton	G. A. Eichler
North Braddock	F. D. Zuerner
North Huntingdon twp. (Address Irwin)	Carl C. Pearsall
Oakmont	W. Lee Gilmore
Oil City	Vaughn R. DeLong
Old Forge	B. T. Harris
Olyphant	John A. Dempsey
Palmerton	J. N. Roeder
Palmyra	R. E. Hartz
Philadelphia	A. J. Stoddard
Phoenixville	Martin L. Peters

City	Superintendent
Pitcairn	R. L. Roose (c)
Pittsburgh	
Pittston	Elizabeth G. Battle
Plains	M. V. Hughes (c)
Plymouth	H. S. Jones
Pottstown	Frank M. Haiston
Pottsville	Paul G. Grim
Prospect Park	Gordon E. Groff
Punxsutawney	James T. Downie
Quakertown	Joseph S. Neidig
Radnor twp. (Address Wayne)	Sydney V. Rowland
Rankin	Dennis J. Sullivan
Reading	Thomas Henry Ford
Ridgway	A. C. Nelson
Ridley twp. (Address Woodlyn)	G. H. Morgart
Rochester	Robert P. Barner
St. Clair	Charles R. Birch
St. Marys	L. T. Kelly (c)
Sandy twp. (Address Du Bois)	Karl M. Brewer
Sayre	L. E. DeLaney
Schuylkill Haven	Paul S. Christman (c)
Scottdale	
Scranton	John H. Dyer
Sewickley	L. H. Conway (c)
Shamokin	J. H. Davison
Sharon	Paul E. Witmeyer
Sharpsburg	Joseph S. McDonald (c)
Sharpsville	Harry E. Pebly
Shenandoah	A. J. Ratchford
Shippensburg	W. P. Harley
South Williamsport	A. B. Elder (c)
Somerset	H. W. Hay
State College	Jo Hays
Steelton	Orris H. Aurand
Stowe twp. (Address McKees Rock)	Gale F. Stroup (c)
Stroudsburg	Robert Brown
Summit Hill	E. T. McCready
Sunbury	Oliver C. Kuntzleman
Swissvale	C. S. Baily
Swoyerville (Address Kingston)	Henry R. Horvat (c)
Tamaqua	F. G. Horner
Tarentum	A. D. Endsley
Taylor	W. J. Powell
Throop	John J. O'Hara
Titusville	John H. Linton
Tredyffrin twp (Address Berwyn)	Hobson C. Wagner
Turtle Creek	W. W. Lantz (c)
Tyrone	Norman Miller
Uniontown	J. N. Mowls
Upper Darby	William C. Sampson
Upper Merion twp. (Address Bridgeport)	Warren H. Cocklin (c)
Vandergrift	John R. Kurtz
Warren	J. G. Rossman
Washington	Meyers B. Horner
Waynesboro	Walter C. Richter
West Chester	G. Arthur Stetson
West Deer twp. (Address Russellton)	Berger Franklin Edlund
West Hazleton	August Martin (c)
West Mahanoy twp. (Address Lost Creek)	Henry F. Murray
West Pittston	R. J. W. Templin
West View	M. J. Horsch (c)
West York	A. H. Martin (c)
Whitehall twp. (Address Hokendauqua)	Clarence M. Gockley
Wilkes-Barre	A. E. Bacon
Wilkinsburg	R. A. Getter
Williamsport	A. M. Weaver
Wilmerding	N. I. Reist (c)
Wilson Boro. (Address Easton)	Harold A. Crane
Windber	Clyde E. Bounds
Winton Boro. (Address Jessup)	J. L. McCloskey
Yeadon	R. H. Koch
York	A. H. Martin

Rhode Island

City	Superintendent
Barrington	Carl H. Porter-Shirley
Bristol	E. S. Mapes

City	Superintendent
Burrillville (Address Harrisville)	J. O. Sweeney
Central Falls	James E. Martin
Coventry	Harold F. King
Cranston	C. W. Bosworth
Cumberland (Address Valley Falls)	Bernard F. Norton
East Providence	J. R. D. Oldham
Johnston	Aaron F. DeMoranville
Lincoln (Address Lonsdale)	John L. Smith
Newport	Michael F. Walsh
North Providence	James L. McGuire
Pawtucket	Frank A. R. Allen
Providence	James L. Hanley
South Kingstown (Address Wakefield)	Donald W. Dunnan
Tiverton	Lewis M. Wager
Warren	John M. Harkins
Warwick	Warren A. Sherman
Westerly	Willard H. Bacon
West Warwick	Maisie E. Quinn
Woonsocket	Leon M. Farrin

South Carolina

City	Superintendent
Aiken	L. K. Hagood
Anderson	E. C. McCants
Camden	J. G. Richards, Jr.
Charleston	A. B. Rhett
Chester	Myron E. Brockman
Clinton	W. E. Monts
Columbia	A. C. Flora
Conway	C. B. Seaborn
Darlington	J. C. Daniel
Easley	W. M. Scott
Florence	John W. Moore
Gaffney	L. F. Carson
Georgetown	W. C. Bynum
Greenville	W. F. Loggins
Greenwood	W. E. Black
Hartsville	J. H. Thornwell
Laurens	C. K. Wright
Marion	T. C. Easterling
Newberry	O. B. Cannon
Orangeburg	A. J. Thackston
Rock Hill	W. C. Sullivan
Spartanburg	L. W. Jenkins
Sumter	W. H. Shaw
Union	Roy A. Hogrefe

South Dakota

City	Superintendent
Aberdeen	C. J. Dalthorp
Brookings	J. E. Martin
Huron	Andrew J. Lang
Lead	R. V. Hunkins
Madison	F. A. Strand
Mitchell	John C. Lindsey
Rapid City	E. B. Bergquist
Sioux Falls	W. I. Early
Watertown	D. D. Miller
Yankton	C. A. Beaver

Tennessee

City	Superintendent
Alcoa	V. F. Goddard
Athens	J. C. Ridenour
Bristol	J. H. Arrants
Chattanooga	W. T. Robinson
Clarksville	C. H. Moore
Cleveland	R. T. Allen
Columbia	J. R. Baker (a)
Dyersburg	C. M. Walker
Elizabethton	E. L. Bowers
Greeneville	Mac Alexander
Harriman	C. R. Black
Humboldt	C. E. Brock
Jackson	C. B. Ijams
Johnson City	C. E. Rogers
Kingsport	R. N. Robinson
Knoxville	Thomas Chafer Prince
Lebanon	W. E. Wilson
Memphis	Ernest C. Ball
Maryville	J. L. Brewer
Morristown	Carl T. Vance
Murfreesboro	J. C. Mitchell
Nashville	W. A. Bass
Paris	W. O. Inman
Pulaski	Arthur Jones
Shelbyville	Troy G. Young
Springfield	W. M. Overcash
Union City	T. D. Ozment

Texas

City	Superintendent
Abilene	L. E. Dudley
Alamo Heights (Address San Antonio)	Robert B. Reed, Acting
Alice	J. W. Roach
Amarillo	C. M. Rogers
Austin	A. N. McCallum
Bay City	
Beaumont	E. W. Jackson
Beeville	Robert J. Marshall
Big Spring	W. C. Blankenship
Bonham	I. B. Carruth
Borger	W. A. McIntosh
Brady	W. E. Whitten
Breckenridge	Jno. F. Bailey
Brenham	C. M. Selman
Brownsville	Ben L. Brite
Brownwood	E. J. Woodward
Bryan	W. D. Wilkerson
Cameron	E. A. Perrin
Childress	Chas. E. Damron
Cleburne	Emmett Brown
Coleman	J. T. Runkle
Colorado	J. E. Watson
Corpus Christi	M. P. Baker
Corsicana	W. H. Norwood
Crystal City	S. H. Fly
Cuero	O. A. Zimmerman
Dallas	H. E. Gable
Del Rio	Drury Wood
Denison	B. M. McDaniel
Denton	R. C. Patterson
Eagle Pass	F. R. Thompson
Edinburg	R. P. Ward
Electra	B. M. Dinsmore
El Paso	A. H. Hughey
Ennis	C. C. Isbell
Fort Worth	W. M. Green
Gainesville	H. O. McCain
Galveston	S. B. Graham
Goose Creek	N. S. Holland
Graham	I. T. Tilmer
Greenville	H. H. Chambers
Harlingen	Ernest H. Poteet
Henderson	C. O. Pollard
Hillsboro	Loy W. Hartsfield
Houston	E. E. Oberholtzer
Huntsville	R. M. Hawkins
Jacksonville	Larue Cox
Kerrville	Hollis A. Moore
Kingsville	C. E. Wade
Lamesa	V. Z. Rogers
Laredo	W. P. Galligan
Lockhart	R. L. Williams
Longview	Henry L. Foster
Lubbock	W. B. Irvin
Lufkin	I. A. Coston
Marlin	H. J. McIlhany
Marshall	E. N. Dennard
McAllen	John H. Gregory
McKinney	Jack R. Ryan
Mercedes	Leon R. Graham
Mexia	Frank L. Williams
Midland	George E. Heath
Mineral Wells	W. A. Ross
Mission	A. D. Smith
Nacogdoches	S. Mortimer Brown
Navasota	J. T. Ferguson
New Braunfels	E. A. Sahm
Orange	J. W. Edgar
Palestine	Bonner Fribbell
Pampa	L. L. Sone
Paris	A. H. Chamness
Plainview	O. J. Laas
Port Arthur	G. M. Sims
Robstown	W. G. Hutson
Rusk	A. S. Moore
San Angelo	Bryan Dickson
San Antonio	I. E. Stutsman
San Benito	S. V. Neeley
San Marcos	Fred Kaderli
Seguin	Joe F. Saegert
Sherman	R. L. Speer
Sulphur Springs	W. L. Willis
Sweetwater	R. S. Covey
Taylor	E. T. Robbins
Temple	George H. Gentry
Terrell	J. E. Langwith
Texarkana	H. W. Stilwell
Texas City	Levi Fry
Tyler	J. M. Hodges
Uvalde	Guy D. Dean
Vernon	C. H. Dillehay
Victoria	J. H. Bankston
Waco	R. H. Brister
Waxahachie	T. C. Wilemon
Weatherford	H. L. Barber
Weslaco	Fred E. Kay
Wichita Falls	H. D. Fillers

Utah

City	Superintendent
Brigham	Hervin Bunderson (a)
Logan	E. Allen Bateman
Murray	James Clove
Ogden	W. Karl Hopkins
Price	G. J. Reeves
Provo	J. C. Moffitt
Salt Lake City	L. John Nuttall, Jr.
Tooele	Sterling Harris

Vermont

City	Superintendent
Barre	Wm. H. Carter
Bennington	Winn L. Taplin
Brattleboro	G. W. Powers
Burlington	Lyman C. Hunt
Montpelier	Thurman H. Bare
Rockingham	Homer B. Ashland
Rutland	W. W. Fairchild
St. Albans	Josiah S. McCann
St. Johnsbury	Frank R. Adams
Springfield	Lyman W. Bole
Winooski	G. R. Stackpole

Virginia

City	Superintendent
Alexandria	T. C. Williams
Bristol	B. D. French
Charlottesville	James G. Johnson
Clifton Forge	Paul G. Hook
Covington	A. L. Bennett (a)
Danville	G. L. H. Johnson
Fredericksburg	G. H. Brown
Hampton	Robert M. Newton (a)
Harrisonburg	W. H. Keister
Hopewell	R. W. Copeland (a)
Lynchburg	Omer Carmichael
Marion	R. F. Williams
Martinsville	E. E. Givens
Newport News	J. H. Saunders
Norfolk	C. W. Mason
Petersburg	Henry G. Ellis
Portsmouth	Harry A. Hunt
Pulaski	Frank J. Critzer
Radford	F. O. Wygal
Richmond	J. H. Binford
Roanoke	D. E. McQuilkin
Salem	R. E. Cook
South Boston (Address Halifax)	R. L. Lacy
South Norfolk	T. C. Anderson
Staunton	L. F. Shelburne
Suffolk	S. T. Godbey
Waynesboro	A. C. Gilkeson
Winchester	G. R. Quarles

Washington

City	Superintendent
Aberdeen	Edward F. Bloom
Anacortes	De Fore Cramblitt
Bellingham	C. Paine Shangle
Bremerton	Tillman Peterson
Centralia	Paul F. Furgeson
Ellensburg	G. L. Putnam
Everett	J. A. Reeves
Hoquiam	H. C. Crumpacker
Kelso	C. H. Lillie
Longview	E. J. McNamara
Olympia	L. P. Brown
Port Angeles	F. W. Breakey
Puyallup	P. B. Hanawalt
Seattle	Worth McClure
Spokane	O. C. Pratt
Tacoma	Howard R. Goold
Vancouver	Paul F. Gaiser
Walla Walla	W. A. Lacey
Wenatchee	W. B. Smith
Yakima	A. C. Davis

West Virginia

City	Superintendent
Beckley	E. M. Ashworth (a)
Bluefield (Address Princeton)	O. H. Archer (a)
Charleston	Virgil L. Flinn (a)
Clarksburg	Arthur V. G. Upton (a)
Dunbar (Address Charleston)	Virgil Flinn (a)
Elkins	Bryan Hamilton (a)

City	Superintendent
Fairmont	J. J. Straight (a)
Grafton	E. G. Kuhn (a)
Hinton	C. W. Mann (a)
Hollidays Cove (Address New Cumberland)	A. L. Rabenstein
Huntington	O. C. Nutter (a)
Keyser	H. L. Idleman (a)
Logan	Paul C. Winter
Martinsburg	G. Wm. Ropp (a)
Morgantown	Floyd B. Cox (a)
Moundsville	Louis R. Potts (a)
Parkersburg	Lloyd H. Wharton (a)
Princeton	C. H. Archer (a)
Richwood (Address Summerville)	James L. Creasy (a)
South Charleston (Address Charleston)	Virgil Flinn (a)
Welch	George W. Bryson (a)
Wellsburg	Olen Rutan (a)
Weston	Marion G. Rogers (a)
Wheeling	J. P. McHenry (a)
Williamson	C. O. Batson (a)

Wisconsin

City	Superintendent
Antigo	P. A. Tipler
Appleton	Ben J. Rohan
Ashland	George A. Bassford
Baraboo	Gordon L. Willson
Beaver Dam	A. H. Luedke
Beloit	V. F. Dawald
Chippewa Falls	Robert F. Lohrie
Cudahy	J. E. Jones
De Pere	T. J. McGlynn
Eau Claire	Alvin T. Stolen
Fond du Lac	T. T. Jenson
Fort Atkinson	Frank C. Bray
Green Bay	G. E. Denman
Janesville	V. E. Klontz
Kaukauna	J. F. Cavanaugh
Kenosha	G. F. Loomis
La Crosse	G. M. Wiley
Madison	Philip H. Falk
Manitowoc	Hugh S. Bonar
Marinette	W. F. Waterpool
Marshfield	H. H. Helms
Menasha	F. B. Younger
Menomonie	W. G. Ballentine
Merrill	George F. Brooks
Milwaukee	M. C. Potter
Monroe	E. O. Evans
Neenah	C. F. Hedges
Oconto	L. W. Fulton
Oshkosh	Charles C. Bishop
Portage	A. J. Henkel
Racine	Wm. C. Giese
Rhinelander	W. F. Kruschke
Rice Lake	J. H. Murphy
Shawano	O. A. Reetz
Sheboygan	H. E. Smith
Shorewood	H. S. Hemenway
South Milwaukee	John P. Mann
Sparta	Wm. R. Bruce
Stevens Point	P. M. Vincent
Sturgeon Bay	J. A. Van Natta
Superior	Angus B. Rothwell
Two Rivers	Fred G. Bishop
Watertown	R. A. Buell
Waukesha	R. F. Lewis
Waupun	H. C. Wegner
Wausau	E. C. Hirsch
Wauwatosa	G. E. Watson
West Allis	H. B. Nash
West Bend	D. E. McLane
West Milwaukee	Mathew Barkley
Whitefish Bay	C. L. Mulrine
Wisconsin Rapids	Floyd Smith

Wyoming

City	Superintendent
Casper	Dean C. Morgan
Cheyenne	J. L. Goins
Laramie	A. A. Slade
Rawlins	Robert B. Lee
Rock Springs	E. M. Thompson
Sheridan	J. J. Early

SECTION XVI

SUPERINTENDENTS OF CATHOLIC PAROCHIAL SCHOOLS

In the following list the names of the archdioceses and dioceses appear in capitals at the left margin. Archdioceses are asterisked.

DIOCESAN SUPERINTENDENTS OF SCHOOLS

Alabama

MOBILE—Rev. Leo M. Byrnes, Superintendent of Parochial Schools, 400 Government Street, Mobile, Ala.

Arizona

TUCSON—Rev. Bernard L. Gordon, Secretary and Chancellor, 192 South Stone Avenue, Tucson, Ariz.

Arkansas

LITTLE ROCK—Very Rev. Msgr. John J. Healy, Diocesan Superintendent of Schools, 2501 State St., Little Rock, Ark.

California

LOS ANGELES *—Rev. Patrick J. Dignan, Diocesan Superintendent of Schools, 714 West Olympic Boulevard, Los Angeles, Calif.

SAN FRANCISCO *—Rev. James T. O'Dowd, Ph.D., Diocesan Superintendent of Schools, 50 Oak Street, San Francisco, Calif.

MONTEREY and FRESNO—Very Rev. Msgr. James Dowling, M.A., Diocesan Superintendent of Schools, 1152 R Street, Fresno, Calif.

SACRAMENTO—Rev. Raymond Renwald, Diocesan Superintendent of Schools, Box 1706, Sacramento, Calif.

SAN DIEGO—Rev. Kenneth G. Stack, Diocesan Superintendent of Schools, 1528 Fourth Avenue, San Diego, Calif.

Colorado

DENVER *—Rev. Hubert M. Newell, Diocesan Superintendent of Schools, 230 East 17th Avenue, Denver, Colo.

PUEBLO—

Connecticut

HARTFORD—Rev. Austin Munich, Diocesan Superintendent of Schools, St. Thomas Seminary, Bloomfield, Conn.

Delaware

WILMINGTON—Rev. Leo W. O'Neill, Diocesan Superintendent of Schools, Hockessin, Dela.

Florida

ST. AUGUSTINE—Rev. R. E. Philbin, Diocesan Superintendent of Schools, 2609 Park St., Jacksonville, Fla.

Georgia

SAVANNAH-ATLANTA—Rt. Rev. Msgr. T. James McNamara, Diocesan Superintendent of Schools, 222 E. Harris St., Savannah, Ga.

Idaho

BOISE—Rt. Rev. Joseph P. O'Toole, Diocesan Director of Schools, 804 N. 9th Street, Boise, Idaho.

Illinois

CHICAGO *—Very Rev. Msgr. D. F. Cunningham, M.A., LL.D., Diocesan Superintendent of Schools, 755 North State Street, Chicago, Ill.

BELLEVILLE—Very Rev. Msgr. John J. Fallon, M.A., Diocesan Superintendent of Schools, 63d and West Main Streets, Belleville, Ill.

PEORIA—Rev. M. J. Haddigan, Diocesan Superintendent of Schools, 405 Smith Street, Peoria, Ill.

ROCKFORD—Rev. William J. Donovan, Diocesan Superintendent of Schools, 95 East Wilson Street, Batavia, Ill.

SPRINGFIELD—Rev. George M. Link, Diocesan Superintendent of Schools, Grafton, Ill.

Indiana

FORT WAYNE—Rev. Thomas E. Dillon, Superintendent of Catholic Schools, % Our Sunday Visitor, Huntington, Ind.

INDIANAPOLIS—Rev. Leonard Wernsing, Diocesan Superintendent of Schools, 144 West Georgia Street, Indianapolis, Ind.

Iowa

DUBUQUE *—Rt. Rev. Msgr. John M. Wolfe, Diocesan Superintendent of Schools, 11th and Bluff Streets, Dubuque, Ia.

DAVENPORT—Rev. Edward J. Butler, Diocesan Superintendent of Schools, Cosgrove Building, Davenport, Iowa.

DES MOINES—Rev. L. V. Lyons, Diocesan Superintendent of Schools, St. Ambrose Cathedral, Des Moines, Iowa.

SIOUX CITY—Rev. C. Ivis, Diocesan Superintendent of Schools, St. Anthony's Home, Sioux City, Iowa.

Kansas

CONCORDIA—Rev. Cornelius Brown, Diocesan Superintendent of Education, St. Joseph's Hospital, Concordia, Kans.

LEAVENWORTH—Very Rev. William T. C. Boland, President of the School Board, 709 N. 5th Street, Leavenworth, Kans.

WICHITA—Rev. Quinton J. Malone, Diocesan Superintendent of Schools, 424 N. Broadway, Wichita, Kans.

Kentucky

LOUISVILLE *—Rev. Felix N. Pitt, Ph.D., Secretary of Catholic School Board, 443 South Fifth Street, Louisville, Ky.

COVINGTON—Rev. Leo J. Streck, Diocesan Superintendent of Schools, 1110 Madison Avenue, Covington, Ky.

OWENSBORO—Same as the Archdiocese of Louisville.

Louisiana

NEW ORLEANS *—Rev. Edward C. J. Prendergast, Superintendent of Catholic Schools, 7845 Apricot Street, New Orleans, La.

ALEXANDRIA—Rev. John Henry Murray, Diocesan Superintendent of Schools, 1805 Jackson Avenue, Alexandria, La.

LAFAYETTE—Rt. Rev. Msgr. Anthony F. Isenberg, Diocesan Superintendent of Schools, Bishop's House, The Cathedral, Lafayette, La.

Maine

PORTLAND—Rev. John J. Barrett, Diocesan Superintendent of Schools, 307 Congress Street, Portland, Maine.

Maryland

BALTIMORE AND WASHINGTON *—Rt. Rev. Msgr. John I. Barrett, Ph.D., J.C.L., Diocesan Superintendent of Schools, 415 Cathedral Street, Baltimore, Md.

Massachusetts

Boston *—Rt. Rev. Msgr. Richard J. Quinlan, S.T.L., Diocesan Superintendent of Schools, 75 Union Park Street, Boston, Mass.

Fall River—Rev. Edward J. Gorman, M.A., Superintendent of Diocesan Schools, 368 North Main Street, Fall River, Mass.

Springfield—Rev. Dr. John R. Rooney, Diocesan Superintendent of Schools, College of Our Lady of the Elms, Chicopee, Mass.

Michigan

Detroit *—Rev. Carroll F. Deady, Ph.D., Diocesan Superintendent of Schools, 1234 Washington Boulevard, Detroit, Mich.

Grand Rapids—Rev. E. L. Quaderer, Diocesan Superintendent of Schools, 385 Leonard Street, N. E., Grand Rapids, Mich.

Lansing—Rev. Jerome V. MacEachin, Diocesan Superintendent of Schools, 92 Capital Street, Battle Creek, Mich.

Marquette—Rev. Martin Melican, Superintendent of Parochial Schools, Holy Family Orphan's Home, Marquette, Mich.

Saginaw—Rev. Robert E. Fitzpatrick, Diocesan Superintendent of Schools, Alpena, Mich.

Minnesota

St. Paul *—Rev. Roger J. Connole, Ph.D., Diocesan Superintendent of Schools, 240 Summit Avenue, St. Paul, Minn.

Crookston—Rev. Victor Miller, Diocesan Superintendent of Schools, St. Joseph's Church, Ada, Minn.

Duluth—Rev. Martin P. Larkin, Diocesan Superintendent of Catholic Schools, 211 West 4th Street, Duluth, Minn.

St. Cloud—Rev. T. Leo Keaveny, Ph.D., Diocesan Superintendent of Schools, Cathedral Rectory, 316 Seventh Avenue N., St. Cloud, Minn.

Winona—Rev. R. J. Jansen, Diocesan Director of Confraternity of Christian Doctrine, 819 2nd Street, Rochester, Minn.

Mississippi

Natchez—Rev. Dr. Geoffrey O'Connell, Diocesan Superintendent of Schools, St. Elizabeth's Catholic Rectory, Clarksdale, Miss.

Missouri

St. Louis—Rt. Rev. James P. Murray, Superintendent of Parish Schools, 2709 Clara Avenue, St. Louis, Mo.

Kansas City—Rev. John J. Murphy, Diocesan Superintendent of Schools, 3142 Broadway, Kansas City, Mo.

St. Joseph—Rev. Joseph W. Helmes, Ph.D., Director of Charities, 519 10th Street, St. Joseph, Mo.

Montana

Great Falls—Rev. John E. Regan, Chancellor, 2300 Central Avenue, Great Falls, Mont.

Helena—Rev. J. A. Rooney, M.A., S.T.L., Diocesan Superintendent of Schools, 1306 North Main Street, Walkerville, Mont.

Nebraska

Grand Island—Rev. Anthony E. Egging, Diocesan Superintendent of Schools, St. Patrick's Rectory, Sidney, Nebr.

Lincoln—Very Rev. Msgr. L. V. Barnes, M.A., Diocesan Superintendent of Schools, 514 South 18th Street, Lincoln, Nebr.

Omaha—Rev. Joseph H. Ostdiek, Diocesan Superintendent of Schools, 2507 Cass Street, Omaha, Nebr.

Nevada

Reno—Very Rev. Robert J. Harrigan, Chancellor and Secretary, P. O. Box 1050, Reno, Nev.

New Hampshire

Manchester—Rev. William J. Collins, Diocesan Superintendent of Schools, Mt. St. Mary's College, Hooksett, N. H.

New Jersey

Newark *—Very Rev. Msgr. Wm. F. Lawlor, LL.D., Diocesan Superintendent of Schools, 31 Mulberry Street, Newark, N. J.

Camden—Rev. Wm. J. Hickey, Diocesan Superintendent of Schools, 10 North Myrtle Street, Vineland, N. J.

Paterson—Rev. Thomas J. Molloy, Diocesan Superintendent of Schools, 2040 De Grasse Street, Paterson, N. J.

Trenton—Rev. Robert J. Graham, M.A., Diocesan Superintendent of Schools, 85 West High Street, Somerville, N. J.

New Mexico

Santa Fe *—Rev. Clarence Schoeppner, Chancellor, Box 707, Santa Fe, N. Mex.

Gallup—Rev. Pax R. Schicker, O.F.M., Chancellor, Cathedral of the Sacred Heart, Box 391, Gallup, N. Mex.

New York

New York *—Very Rev. Msgr. William R. Kelly, M.A., Diocesan Superintendent of Schools, 23 East 51st Street, New York, N. Y.

Albany—Rev. James P. Hanrahan, M.A., LL.D., Superintendent of Parish Schools, 695 Fifth Avenue, Watervliet, N. Y.

Brooklyn—Rt. Rev. Msgr. Joseph V. S. McClancy, LL.D., Diocesan Superintendent of Schools, 75 Greene Avenue, Brooklyn, N. Y.

Buffalo—Rev. Sylvester J. Holbel, Superintendent of Catholic Schools, 35 Niagara Square, Buffalo, N. Y.

Ogdensburg—Very Rev. Msgr. John M. Hogan, Diocesan Superintendent of Schools, 218 Hamilton Street, Ogdensburg, N. Y.

Rochester—Rev. John M. Duffy, Diocesan Superintendent of Schools, 50 Chestnut Street, Rochester, N. Y.

Syracuse—Rev. David C. Gildea, M.A., J.C.L., S.T.B., Diocesan Superintendent of Schools, 257 E. Onondaga Street, Syracuse, N. Y.

North Carolina

Raleigh—Rev. Robert J. MacMillan, Superintendent of Schools, Western North Carolina, P. O. Box 464, Burlington, N. C.

Rev. Edward T. Gilbert, Superintendent of Schools, Eastern North Carolina, St. Agnes Rectory, Washington, N. C.

Belmont Abbey Nullius—Rev. Thomas Oestreich, O.S.B., S.T.D., Chancellor, Belmont, N. C.

North Dakota

Bismarck—Rev. John W. Hogan, Diocesan Superintendent of Schools, St. Leo's School, Minot, N. Dakota.

Fargo—Rev. William T. Mulloy, Diocesan Superintendent of Schools, 619 Sixth Avenue, N., Grafton, N. Dakota.

Ohio

Cincinnati *—Very Rev. Msgr. Carl J. Ryan, Ph.D., Diocesan Superintendent of Schools, 28 Calhoun Street, Cincinnati, Ohio.

Cleveland—Rt. Rev. Msgr. John R. Hagan, Ph.D., Diocesan Superintendent of Schools, 621 N. B. C. Building, Cleveland, Ohio.

Columbus—Rt. Rev. Msgr. John J. Murphy, Diocesan Superintendent of Schools, 1651 East Main Street, Columbus, Ohio.

Toledo—Rev. Norbert M. Shumaker, Ph.D., Diocesan Superintendent of Catholic Schools, 807 Superior Street, Toledo, Ohio.

Oklahoma

Oklahoma City and Tulsa—Rev. J. B. Dudek, Chancellor, 1521 N. Hudson Street, Oklahoma City, Okla.

Oregon

Portland *—Rev. Arthur J. Sullivan, Diocesan Superintendent of Schools, 2053 S. W. 6th Avenue, Portland, Ore.

Baker City—Rev. John D. Lee, Diocesan Superintendent of Schools, Baker, Ore.

Pennsylvania

Philadelphia *—Rt. Rev. Msgr. John J. Bonner, D.D., LL.D., Superintendent of Parochial Schools, 19th and Wood Streets, Philadelphia, Pa.

Altoona—Rev. Francis A. McNelis, Diocesan Superintendent of Schools, 511 20th Street, Altoona, Pa.

Erie—Rev. Robert B. McDonald, Superintendent of Catholic Schools, 225 West 9th Street, Erie, Pa.

Harrisburg—Rev. Harold E. Keller, Diocesan Superintendent of Schools, 22nd and Market Streets, Harrisburg, Pa.

Pittsburgh—Rev. Thomas J. Quigley, Diocesan Superintendent of Schools, 5325 Penn. Avenue, Pittsburgh, Pa.

Scranton—Rev. J. J. Featherstone, M.A., J.C.L., LL.D., Diocesan Superintendent of Schools, 401 Linden Street, Scranton, Pa.

Rhode Island

Providence—Rev. Thomas V. Cassidy, M.A., S.T.L., Ed.D., Diocesan Superintendent of Schools, 25 Fenner Street, Providence, R. I.

South Carolina

Charleston—Rt. Rev. Joseph L. O'Brien, S.T.D., LL.D., Diocesan Superintendent of Schools, 136 St. Philip Street, Charleston, S. C.

South Dakota

Rapid City—Rev. Michael T. Costigan, Chancellor, 1622 West Boulevard, Rapid City, S. Dak.

Sioux Falls—Rt. Rev. Msgr. W. S. O'Meara, Diocesan Superintendent of Schools, Watertown, S. Dak.

Tennessee

Nashville—Rev. S. Ernest Wiley, Ph.D., S.T.L., Diocesan Superintendent of Schools, 2300 Elliston Place, Nashville, Tenn.

Texas

San Antonio *—Rev. President of the School Board, 230 Dwyer Avenue, San Antonio, Texas.

Amarillo—Rev. John Rogg Schmidt, J.C.L., Vice-Chancellor, Box 2009, Amarillo, Texas.

Corpus Christi—Rev. James H. Kelly, Diocesan Superintendent of Schools, P. O. Box 284, Rockport, Texas.

Dallas—Rev. Thomas S. Zachry, Diocesan Superintendent of Schools, 2712 Swiss Avenue, Dallas, Texas.

El Paso—Very Rev. J. C. M. Garde, S.J., Diocesan Director of Schools, 1012 North Mesa Avenue, El Paso, Texas.

Galveston—Rt. Rev. Jacob Schnetzer, Diocesan Superintendent of Schools, 4015 Sherman Avenue, Houston, Texas.

Utah

Salt Lake—Rev. Robert J. Dwyer, Ph.D., Diocesan Superintendent of Schools, 333 East South Temple Street, Salt Lake City, Utah.

Vermont

Burlington—Very Rev. William P. Crosby, President of the School Board, 7 Fullerton Avenue, Montpelier, Vt.

Virginia

Richmond—Rev. Francis J. Byrne, Diocesan Superintendent of Schools, 811 Cathedral Place, Richmond, Va.

Washington

Seattle—Rev. Edward J. McFadden, Diocesan Superintendent of Schools, 907 Terry Avenue, Seattle, Wash.

Spokane—Rev. Roy E. Thelen, Chancery Office, 1115 West Riverside Avenue, Spokane, Wash.

West Virginia

Wheeling—Rev. John J. O'Brien, Superintendent of Parochial Schools, 464 Washington Avenue, Clarksburg, W. Va.

Wisconsin

Milwaukee *—Rev. Edmund J. Goebel, Ph.D., Diocesan Superintendent of Schools, 625 North Milwaukee Street, Milwaukee, Wis.

Green Bay—Rev. E. J. Westenberger, Ph.D., Diocesan Superintendent of Schools, 131 South Madison Street, Green Bay, Wis.

La Crosse—Rev. Lester W. Seemann, Diocesan Superintendent of Schools, Box 664, La Crosse, Wis.

Superior—Rev. Joseph Annabring, Diocesan Superintendent of Schools, 1201 Hughitt Avenue, Superior, Wis.

Wyoming

Cheyenne—Rev. James A. Hartmann, Chancellor, 2105 Capitol Avenue, Cheyenne, Wyo.

SECTION XVII

AIDS AVAILABLE TO LOCAL SCHOOL BOARDS FROM STATE DEPARTMENTS

PARTICIPATION OF STATE AGENCIES IN PLANNING AND SUPERVISING LOCAL SCHOOL-BUILDING DEVELOPMENT

IN the planning of buildings for a public school system, it frequently is desirable to know the degree to which the state board of education has provided for participation and cooperation. The following summary segregates the character of the supervision given by the state and its representative agencies under three headings. The first item indicates the action which the state board may be expected to take. The second item shows the part played by the state superintendent of schools as the official spokesman for the state department of education. In the third part will be found indications of the assistance or guidance which other state agencies will give. The form of tabulation has necessitated very brief statements covering these responsibilities, but the degree and character of participation are clearly shown for each state. The list has been revised up to December, 1941.

THE STATES' PARTICIPATION IN SCHOOL-BUILDING CONSTRUCTION

Alabama

State Board of Education, Montgomery
Approves rules and regulations submitted by state superintendent.
State Superintendent of Education, A. H. Collins
Prepares and submits to the state board of education rules and regulations pertaining to: operation of state minimum program; minimum standards for school sites; minimum standards for plans, specifications, and construction of school buildings; for the issuance of warrants for capital outlay purposes. Recommends school legislation to legislature.
Schoolhouse planning is a service in the division of administration and finance. In addition to the preparation of rules and regulations as listed above, the following services are rendered:
Plans and specifications are prepared for rural school building construction.
Plans and specifications prepared by private architects are approved.
Buildings in process of construction are inspected upon request to determine whether plans and specifications are being followed.
Rules and regulations of the state board are administered to insure the proper execution.
School surveys set up a practicable long-time program for locating school centers, for school-building construction and maintenance, for tax districts, for school finance, for capital outlay debt service, for safe and adequate school transportation where needed, for the teaching personnel, for child accounting, and for record keeping. The state institutions of higher learning cooperate in furnishing trained and experienced consultants on survey work. No capital outlay expenditures can be made except at school centers approved by the survey program. The school-building program is determined in terms of the curriculum, road conditions, public school fund, and transportation which may be made available.
Each county is required to submit annually a building and capital outlay program which must be approved before actual work on the program is undertaken.
Director of the Division of Administration and Finance, R. L. Johns
Supervisor of Research and Surveys, A. R. Meadows
Supervisor of Schoolhouse Planning, R. E. Ledbetter
Architect, W. E. Campbell, Jr.

Arizona

State Board of Education, Phoenix
No jurisdiction whatever in regard to buildings erected by districts.
State Superintendent of Public Instruction, E. D. Ring
No jurisdiction.
Other Agencies
Board of health issues regulations.

Arkansas

State Board of Education, Little Rock
Has a section of school grounds and schoolhouse planning.
Supervisor prepares plans for 1- to 7-teacher buildings, and for such buildings as teachers' homes, shops, home economics buildings, gymnasiums, etc.
Furnishes preliminary sketches of floor plans for larger buildings.
Checks architects' plans for school buildings upon request.
Advises school officials as to plans for remodeling, repairing and altering school buildings.
Advises superintendents and teachers as to interior arrangements, furniture and equipment, and maintenance and operation of school plant.
Superintends the construction of school buildings during progress of erection, except when the district employs an architect.
State Commissioner, Ralph B. Jones
No legal provision for approval.
Supervisor School Plant Service, J. L. Taylor

California

State Superintendent of Public Instruction, Walter F. Dexter, Sacramento
Division of schoolhouse planning passes on all plans costing more than $5,000, excepting those in the largest cities; is called into consultation by city districts, and controls other situations by surveys.
Site sizes and locations controlled by state standards.
School sites may not be purchased in non-city districts until written report and recommendation made by Division of Schoolhouse Planning (1939).
Chief of division issues affidavit authorizing establishment of special accumulative building funds when requested by a school district and when request appears justified following a survey.
No building contract, in situations coming under the department's jurisdiction, is legal without the required approval.
This department does not make a practice of furnishing working drawings.
Chief of Division of Schoolhouse Planning, Dr. Charles W. Bursch
Architect, Doyt Early

Colorado

State Superintendent of Public Instruction, Mrs. Inez Johnson Lewis, Denver
School building handled by local boards of education.

Connecticut

State Board of Education, Hartford
Has a section of buildings and plans which approves plans for enlargement and new construction. It inspects school buildings for safety.
Publishes standards for guidance of local boards.

Has architect to whom plans are referred.
Assists local communities in building surveys.
State Commissioner, A. G. Grace
Supervisor of Buildings and Plans, John E. Nichols

Delaware

State Board of Education, Dover
Outside Wilmington prepares a tentative program of school building to submit to local boards.
Hears comments and suggestions thereon.
Creates standards with effect of law, governing hygienic, sanitary, and protective construction; selection, arrangement, and maintenance of sites; condemns school buildings.
Has approval of plans and specifications.
State Superintendent of Public Instruction, Dr. H. V. Holloway
Building Program
The 1941 Legislature appropriated $750,000.
Other Agencies
Legislature has created a state school-building act.
State school-building commission for each district.
Plans approved by state board of education and commission.
Buildings built by commission.
Construction supervised by commission.
Board of health has to approve drinking water and sewage disposal.

Florida

State Board of Education, Tallahassee
Prescribes rules and regulations and minimum standards in the field.
State Superintendent of Public Instruction, Colin English
Has oversight, charge, and management of all matters pertaining to public schools, school buildings and grounds.
The state department renders the following services:

1. In cooperation with county boards of public instruction, carries on surveys to determine where elementary and secondary school centers should be located, the steps that should be taken in carrying out the building program, and the means of financing the building program.
2. All capital outlay projects are submitted along with the annual school budget. Advice is rendered in connection with these proposals.
3. All plans for school buildings to be constructed are submitted to the department for approval. When necessary, recommendations are given relating to desirable improvements in the plans.
4. Plans are prepared for some of the buildings where architectural services are not available. Consultative and advisory services relating to the letting of contracts and other problems involved in the planning and construction of school buildings are provided through this department.

Director of Administration and Finance, Edgar L. Morphet
Has direction of division, which includes work in surveys, transportation, school plant planning, and architectural service.
School Plant Planning Service, J. L. Graham
School Architect, James A. Stripling
School Surveys and Transportation, T. George Walker

Georgia

State Superintendent of Schools, Dr. M. D. Collins, Atlanta
Furnishes plans and specifications for school-building guidance in local units.
Supervisor of schoolhouse construction prepares plans for 1- to 6-teacher buildings; prepares school ground plans; checks architects' plans; advises school officials.
Other Agencies
County superintendent and county board of education approve plans.

Idaho

State Board of Education, Boise
Requires approval of all plans.
State Superintendent, C. E. Roberts
Member of state board of education and its executive officer.
Other Agencies
Department of public welfare has to cooperate with state board of education in its duties regarding schools.
County superintendent has power to require local trustees to conform to rules of state board "if there is money enough."
County board of health is responsible for sanitation in schools.

Illinois

State Superintendent of Public Instruction, John A. Wieland, Springfield
Prepares, with advice of state board of health, state architect, and state fire marshal, specifications for minimum requirements in heating, ventilation, lighting, seating, water supply, toilets, safety against fire.
Determines the standards for recognition of elementary schools. These have force of law.
Other Agencies
State architect is required to assist the state superintendent of schools.
Enforcement of law is in the hands of county superintendents and local authorities.
County superintendent advises school officials in details of construction, but only on standards is it necessary to follow him.
County superintendent inspects buildings.
Board of directors and board of education required to submit plans to county superintendent.

Indiana

State Superintendent of Public Instruction, C. T. Malan, Indianapolis
Other Agencies
Local school trustees erect buildings. Plans and specifications must be submitted to state board of health for approval of sanitation and hygiene; to state board of accounts for adequacy of specifications and fair competition; and to state fire marshal for compliance with state fire laws.
State board of health issues standards.

Iowa

State Superintendent of Public Instruction, Jessie M. Parker, Des Moines
Shall determine, so far as practicable, by inspection or otherwise, the condition, needs, and progress of the schools under the supervision and control of his department.
Shall have prepared and published a pamphlet containing suitable plans and specifications for public school buildings, including the most approved means and methods of heating, lighting, and ventilating the same, together with information and suggestions for their proper and economical construction.

Kansas

State Board of Education, Topeka
"No provision in the laws to prevent the erection of undesirable buildings or to compel the discontinuance of buildings that should be abolished immediately, further than plans for all new school buildings must be submitted to the state architect as to provision for fire protection according to law." Section 367, Revised School Laws of Kansas for 1937.
Has adopted standardization of rural schools involving among other things: out-building; school-building equipment; and the school building itself.
State Superintendent of Public Instruction, Geo. L. McClenny
Criticizes and approves plans submitted voluntarily by local authorities.
State Architect, Roy W. Stookey

Kentucky

State Board of Education, Frankfort
Authorized to approve and adopt regulations for the sanitary and protective construction of public school buildings.
State Superintendent of Public Instruction, John W. Brooker
With concurrence of state board of health prepares regulations for the sanitary and protective construction of public school buildings. Prepares plans and specifications for 1- to 4-teacher public school buildings, for adoption by the state board of education. Examines and approves or disapproves plans and specifications submitted by county boards of education and graded boards of education.

Louisiana

State Superintendent of Public Education, John E. Coxe, Baton Rouge
The state law requires approval of all school plans by the state superintendent. Plans must be drawn by licensed school architects.
Other Agencies
The state law also requires that the school plans shall be approved by the state board of health, fire marshal, and parish school board.

Maine

Commissioner of Education, Harry V. Gibson, Augusta
No school building can be built or repaired without his approval, where the expenditure is in excess of $500.
Provides plans for 1- to 4-room buildings free of cost.
Issues minimum requirements so that local units will be able to meet his approval of plans.
Other Agencies
No school building can be built or repaired without approval of board of health, where the expenditure is in excess of $500.

Maryland

State Board of Education, Baltimore

Elementary schools. Standardization includes grounds, buildings, lighting, heating and ventilation, library, equipment.

Has issued "Standards for School Buildings" as a guide to county superintendents.

State Superintendent of Schools, Dr. Albert S. Cook

Sites and plans for buildings and additions must be submitted to him for approval.

After plans have been approved by the state consultant architect, the state superintendent issues certificate without which no building costing $300 or more may be erected (Sec. 30, Article 77, Annotated Code of Maryland).

Other Agencies

Plans must be submitted to state board of health for approval of sewage-disposal arrangements and plumbing.

Massachusetts

State Department of Education, Boston

Acts in an advisory rather than supervisory capacity.

State Commissioner of Education, Walter F. Downey

Assistants of superintendent do much in consulting with local committees. Loan slides.

Other Agencies

Department of Public Works issues school-bus regulations.

Department of Public Safety issues regulations.

Department of Mental Health (through clinics, examines children who are retarded in mental development).

Department of Public Welfare (social worker visits physically handicapped children and submits recommendation as to home instruction).

Department of Public Health co-operates in preparation of forms for test cards, blanks, etc., for physical examination of school children.

Director of Buildings' Inspection Division, Department of Public Safety, George C. Parsons, 3 Hancock St., Boston

Michigan

State Department of Public Instruction, Lansing

Provides consultation to boards of education and school administrators regarding surveys, legal procedures, finance, and educational designing.

Approves school building plans from viewpoint of educational use.

State Superintendent, Eugene B. Elliott

Other Agencies

State fire marshal cooperates for elimination of fire hazards.

State department of health cooperates for provision of proper sanitation.

Public debt commission assists in problems of debt service.

Minnesota

State Board of Education, St. Paul

Prescribes rules for school sites and for the mechanical equipment, erection, enlargement and change of school buildings.

Approves plans and specifications for erection, enlargement and change of school buildings before contract is let.

Includes rules made by state board of health relative to sanitary standards for toilets, water-supply, and sewage disposal.

Prepares and furnishes plans and specifications for school buildings of two classrooms or less.

State Commissioner, Harry E. Flynn

Other Agencies

Division of sanitation, state board of health, examines and approves all school-building plans relative to water supply, sewage disposal and plumbing systems.

The law directs county superintendents to advise teachers and school boards in regard to plans for building and improving schoolhouses and caring for school grounds.

Director, Division of Buildings, I. O. Friswold.

Mississippi

State Department of Education, Jackson

Has a division of school building service. This division:

- Cooperates in making surveys on the effective organization of schools.
- Makes surveys to determine building needs.
- Outlines building programs.
- Approves architects' plans and specifications for school buildings.
- Furnishes free plans and specifications for some small school buildings, teachers' homes and accessory buildings.
- General advisory service on school-plant planning and equipment and on the effective use of the school plant.

State Superintendent, J. S. Vandiver

School Building Service, W. G. Eckles, State Director

Missouri

State Superintendent of Education, Jefferson City

Provides standards for schoolhouse planning, provides plans for one-, two-, and three-room buildings, makes surveys and sets up educational specifications for buildings to be erected, checks and approves plans and specifications, also lets contracts, provides school-building insurance surveys, and maintains a state-wide system of janitorial training schools.

State Superintendent of Public Schools, Lloyd W. King

Other Agencies

The state department of public health aids in checking the water supply.

Director of School Building Service, N. E. Viles

Montana

State Board of Education, Helena

Publishes a bulletin containing a list of standards for rating 1- and 2-room elementary and high schools.

State Superintendent of Public Instruction, Elizabeth Ireland

Building plans are furnished local boards by the board of health.

Nebraska

State Superintendent of Public Instruction, Charles W. Taylor, Lincoln

Advises with school authorities regarding building programs when officials request conferences. The state department does not maintain technically trained people for this service, and Nebraska has no law requiring construction according to specifications.

Nevada

State Board of Education, Carson City

Must prepare plans and specifications for rural schoolhouses on standard lines of school architecture as to size, lighting, heating, ventilation and general sanitation. The trustees of rural schools needing new schoolhouses shall be supplied with such plans and specifications upon request.

No public schoolhouse may be erected in any school district until the plans have been approved by the deputy superintendent of public instruction.

State Superintendent of Public Instruction, Miss Mildred Bray

New Hampshire

State Board of Education, Concord

State Commissioner, James N. Pringle, Executive Secretary of State Board of Education

Interprets meaning of "suitable and sanitary" buildings for all schools. Has general authority to make regulations. Co-operates with superintendents and local school boards in planning buildings.

Recommends to state board of health investigation of unsuitable buildings.

Administrative Field Agent, Paul E. Farnum

Other Agencies

State board of health, on complaint, may condemn or order buildings improved at expense of districts.

New Jersey

State Board of Education, Trenton

Advice and consent to appointment of building inspector by commissioner of education.

Approves plans and specifications for all schoolhouse construction.

Has set up a school building code.

State Commissioner of Education, Dr. Charles H. Elliott

Appoints an inspector of school buildings, with advice and consent of state board of education.

May instruct county and city superintendents as to constructing schoolhouses and furnishing them.

Inspector of School Buildings, Seymour Williams

Recommends approval of plans and specifications for schoolhouse construction.

Inspects all new construction and old buildings.

Advises local school officials on school building needs.

Assists in school building surveys.

Other Agencies

County superintendent has power to inspect the condition of schoolhouses, sites, etc., and to advise with local boards in respect to construction, heating and ventilation, and lighting. May, with consent of commissioner of education, cause state moneys to be withheld where facilities are not in accord with legal requirements. Rules of the state board of education require the county superintendent to make periodic reports to the commissioner of education on the condition of buildings.

Local boards provide school buildings.

New Mexico

State Board of Education, Santa Fe
Approves minimum building standards to be followed by the director in charge of approval for all school building plans.
Gives official approval to proposed bond issues.
Other Agencies
State health officials make reports to the education department whenever undesirable health conditions are discovered.
State Superintendent of Public Instruction, Mrs. Grace J. Corrigan
Director, Division of Instruction in Charge of Building Plans Approval, L. W. Clark

New York

State Education Department, Albany
Has a division of school buildings and grounds with a director.
Has set up standards.
Board issues a pamphlet of information for local authorities.
Makes inspections of sites and school conditions before definite action is taken by local authority.
Advises with superintendents, principals, and boards in regard to needs and best way to meet them.
Examines preliminary plans.
State Commissioner, Dr. Ernest E. Cole
All plans and specifications must receive the commissioner's approval in all districts other than first and second class cities.
He cannot approve unless plans conform to laws.
No tax can be levied until plans are approved.
Director of School Buildings and Grounds Division, Gilbert L. Van Auken

North Carolina

State Board of Education, Raleigh
Has a division of schoolhouse planning.
There is a literary loan fund from which loans are made when plans are approved.
Suggestions for planning school plants are distributed from time to time by state department of public instruction.
Has plans for one-story schools and gymnasiums which are distributed free by director of schoolhouse planning.
State Superintendent of Public Instruction, Clyde A. Erwin
Law requires that all plans be approved by state superintendent of public instruction.
Other Agencies
State insurance commissioner for fire safety, and state board of health for sanitary facilities.
Director, Division of Schoolhouse Planning, W. F. Credle

North Dakota

State Superintendent of Public Instruction, Arthur E. Thompson, Bismarck
Plans must be submitted to and approved by superintendent.

Ohio

State Director of Education, Kenneth C. Ray, Columbus
Other Agencies
Has a state building code (very elaborate).
All plans must be approved by chief inspector of workshops and factories, except in cities having regularly organized building inspection departments.
District health commissioner checks plans for water-supply and sanitary arrangements. State department of health may make surveys and issue orders as to these matters.

Oklahoma

State Superintendent of Public Instruction, A. L. Crable, Oklahoma City
Prepares complete plans and specifications when requested for the construction of school buildings for four teachers or less, costing less than $10,000.
Makes school-building survey for all sizes of buildings.
Approves plans of all sizes but approval is not required by law.
Other Agencies
Standard building laws.
Book of 300 plans in hands of each county superintendent in the state.
Director of Schoolhouse Planning, Frank Williams

Oregon

State Board of Education, Salem
Architectural plans for new high-school buildings are presented to the state department of education for approval before calls for bids on the construction of the buildings are submitted.
State Superintendent of Public Instruction, Rex Putnam
Manual on "The Construction and Care of School Buildings" issued to all school districts. No legal provision for the approval of the state department, but an advisory service is maintained.
Other Agencies
Plans for schools in third-class districts must be approved by county school superintendents.
County superintendents advise with the school boards relative to the construction, warming, ventilating, and arrangement of schoolhouses.
All schools are examined periodically by representatives from the state department of education and county school superintendents.
All buildings are inspected periodically by the state fire marshal.

Pennsylvania

State Department of Public Instruction, Harrisburg
Has a division of school buildings.
Prescribes rules and regulations and makes such recommendations as it may deem expedient to promote physical and moral welfare of school children.
Department code—
Required to approve plans in 2nd, 3rd, 4th class districts.
Supervises preparation of plans in local communities.
Submits suggestive sketches.
State Superintendent of Public Instruction, Dr. Francis B. Haas
Chief, Division of School Plant, Dr. HuBert C. Eicher
Other Agencies
State code.
Art commission passes on architectural design.
Department of labor and industry passes on fire and panic protection.

Rhode Island

State Director of Education, James F. Rockett, Providence
Part of the income of the permanent school fund may be apportioned by the director of education to assist towns in constructing model school buildings.

South Carolina

State Superintendent of Education, Dr. James H. Hope, Columbia
Division of schoolhouse planning and construction. Plans must be submitted to and approved by the director of schoolhouse planning.
The director inspects all plans and new buildings, and a certificate of approval is necessary before they can be used.
Plans and specifications and supervision of construction are furnished to small schools not employing an architect.
Other Agencies
Has a state building code.
Director of Schoolhouse Planning, S. P. Clemons

South Dakota

State Superintendent of Public Instruction, J. F. Hines, Pierre
Plans must be approved by him, and show heating and ventilation scheme. He assists in an advisory capacity in the planning of school buildings; he also helps boards in various ways to show their communities the needs of new buildings and additions to buildings.

Tennessee

State Commissioner of Education, B. O. Duggan, Nashville
Division of schoolhouse planning and transportation furnishes sketches and layouts for school buildings and various special rooms and works with the various school boards in projecting building programs over long periods of time. The division offers functional planning advice and checks plans for larger buildings where such service is requested.
State Director of Schoolhouse Planning and Transportation, H. C. Headden

Texas

State Board of Education, Austin
Purchases school district bonds or grants waiver for district to sell in open market.
State Superintendent, L. A. Woods
Administrative officer of public school laws and ex-officio secretary of the state board, receives reports required by statute and is general superintendent of business relating to the public schools.
Other Agencies
School-building code.
Plans must be submitted as follows for approval: (1) in a common school district—to the county superintendent; (2) independent district and city or town—to superintendent of schools.

These agencies report to state department what they have done and transmit evidence.

State Director of School Plant Division, J. Fred Horn

Prepares plans for 1- to 6-teacher buildings, and suggestive sketches for larger buildings; advises school officials; checks architects' plans; makes school-building surveys upon invitation; visits local units upon invitation.

Utah

State Board of Education, Salt Lake City

There is a department of building codes.

State Superintendent of Public Instruction, Charles H. Skidmore

Where the expenditure is in excess of $5,000, his approval of plans and specifications is required before construction may be undertaken.

Is required to formulate a code to govern preparation of plans by local communities.

With approval of state finance commission, may hire an architect to examine plans or inspect buildings and where necessary shall make recommendations for conformity to code.

Vermont

State Department of Education, Montpelier

Public school buildings are standardized with "points" on buildings, grounds, equipment.

Plans "should be" submitted to state department.

Issues plans, pictures and bulletins.

Employs a part-time draftsman to prepare plans and specifications for rural communities without charge.

Provides for follow-up work during the period of construction.

State Commissioner, Ralph E. Noble

Other Agencies

Plans "must be" submitted to board of health.

Virginia

State Board of Education, Richmond

Has a division of school buildings.

Prepares plans and specifications for school divisions on request.

Supervises construction free of charge.

Minimum standards have been set up and approved.

Cooperates with local boards in:

- (a) Long-range studies of school building programs.
- (b) Preparing preliminary plans and estimates.
- (c) Developing working drawings and specifications and landscaping plans.
- (d) Attendance at openings of proposals.
- (e) Supervision of construction, including periodic inspections.

State Superintendent of Public Instruction, Sidney B. Hall

State Director, Division of School Buildings, Raymond V. Long

Washington

State Superintendent of Public Instruction, Olympia

Has been given "some power" through law on "wider use of school plant."

State Superintendent of Public Instruction, Pearl A. Wanamaker

State building fund available to school districts. Applications for such aid are made to superintendent of public instruction who, after consultation with Reorganization Committee and other appropriate agencies, recommends to state social security commission the amount to be allotted. Plans for any buildings which the State assists in financing must be approved by superintendent of public instruction.

Other Agencies

County superintendents approve plans in 3rd class districts.

West Virginia

State Board of Education, Charleston

May require all plans and specifications for the erection of school buildings to comply with the requirements of law; and may require all county boards to submit all plans and specifications for the state board's approval.

Plans and specifications are approved by the state board of education in accordance with the board's order.

State Superintendent of Free Schools, W. W. Trent

Wisconsin

State Department of Public Instruction, Madison

Under a cooperative agreement between the industrial commission and the department, all school plans are sent to the latter by the commission for checking and suggestive criticisms looking towards the erection of first-class buildings.

Helps local communities by suggesting plans for all types of buildings to serve as a basis for extended work by commercial architects.

Service has been extended to cover expert advice on heating, ventilation, lighting.

The department develops complete plans and specifications and gives architectural service for 1- and 2-room rural schools on request.

Inspects all types of schools with a view to improving housing conditions and facilities; makes complete building surveys in all types of communities on request.

Gives field service and makes inspection upon request.

Cooperates with all state agencies which have partial jurisdiction (through codes) over school buildings.

State Superintendent of Public Instruction, John Callahan

Other Agencies

The law requires submission of all school plans to industrial commission. This checking refers primarily to the application of the state building code and pays attention primarily to construction, safety and sanitation.

Supervisor of School Building Service, H. W. Schmidt

Wyoming

State Superintendent of Public Instruction, Esther L. Anderson, Cheyenne

Entrusted with general supervision of the public schools of the state.

Commissioner of Education, Ray E. Robertson

He shall prepare for the use and guidance of the district board regulations and suggestions for standardizing and grading schools and for the hygienic and sanitary building of schoolhouses and the selection of sites.

CAPITOL STAGE LIGHTING COMPANY

E. ALTMAN, Proprietor

527–529 West 45th Street, New York, N. Y.

Cable Address: CAPCOLITE, New York

Distributed Abroad by
ELECTRICAL RESEARCH PRODUCTS, INC.
Subsidiary of
WESTERN ELECTRIC COMPANY

Manufacturers of complete

Stage Lighting Apparatus for the Theatre, Production, Amateur Theatricals, Schools, Churches, Community Center, Little Theatres, Halls, Etc.

Aisle Lights	Dimmers	Pipe Clamps
Asbestos Wire	Dimmer Boxes	Plugging Boxes
Automatic Colorwheels	Electric Fountains	Proscenium Lights
Automatic Lighting	Electric Coal Grates	Panel Pockets
Act Announcers	Electric Fire Logs	Plugs
Arc Lamps	Effects	Reflectors
Advertising Novelties	Exit Signs	Rheostats
Borderlight Cables	Floor Pockets	Sciopticons
Baby Spotlights	Fireplaces	Spotlights
Boomerangs	Floodlights	Stage Pockets
Borderlights	Footlights	Stereopticons
Bunchlights	Film Cabinets	Strip Lights
Cable Clamps	Gelatine	Switch Boxes
Cable Supports	Iris Shutters	Slide Carriers
Carbons	Lenses	Scenic Effects
Colorine	Light Fixtures	Shutters
Connectors	Lobsterscopes	Signs
Crystal Reflectors	Lugs	Step Lights
Carbon Holders	Lens Holders	Stage Cable
Cleaner Stands	Music Stands	Switchboards
Colorframes	Mirror Balls	Torches
Colorwheels	Organ Lights	Wall Pockets
Cove Lighting	Olivettes	Work Lights
Crystal Showers	Objectives	Etc.
Dissolvers	Piano Lights	

COMPLETE CATALOG ON REQUEST

SECTION XVIII
CLASSIFIED INDEX TO MANUFACTURERS' PRODUCTS

MONTGOMERY TIME SYSTEMS

Dependable — Economical Signal Systems

Owensville, Indiana

WILL *YOUR* STUDENTS AND TEACHERS RECEIVE *AMPLE* WARNING IF AN AIR RAID STRIKES *YOUR* CITY? IT IS *YOUR* DUTY TO SEE THAT THEY *DO!*

The Montgomery ALL-OUT ALARM will transmit distinctive warning signals over your present bell or buzzer system at a fraction of the cost for installing special sirens or other signals to insure ample warning.

Easily installed. Does not interfere with normal use of the signal system.

MONTGOMERY PROGRAM CLOCKS, like their predecessor the Hansen Program Clock, are known for the accurate and dependable service they are giving in schools and factories throughout the nation. Designed only for automatic control of signals, they are simple to install and to operate. The metal disk program machine permits rearranging the schedule at any time with a minimum of effort.

For schools with a limited budget, the MEMO Program Clock is ideal. It can also be used for control of special schedules, laboratory equipment, school traffic lights, etc.

COMPLETE INFORMATION ON OUR PRODUCTS WILL BE SENT PROMPTLY UPON REQUEST.

For information on a specific subject—

TABLE OF CONTENTS—Page 5

INDEX TO EDITORIAL SUBJECTS—Page 8

• • •

For names and addresses of

School Architects—Page 139
Mechanical and Electrical Engineering Consultants—Page 148
Landscape Architects—Page 193
College Presidents—Page 438
Junior College Presidents—Page 446
Private School Headmasters—Page 451
School Superintendents—Page 456
Superintendents of Catholic Parochial Schools—Page 465
State Education Officials—Page 467

Use the RETURN-ADDRESSED POSTCARDS—
For information on any product, whether or not
it is listed in this volume.

TRAFFIC & STREET SIGN COMPANY

Flag Poles Made of Steel, Copper-Bearing Steel, Stainless Steel, Bronze and Aluminum

78 Foundry Street
Newark, N. J.

CO-OPERATION WITH ARCHITECTS AND SCHOOL OFFICIALS

Due to our many years of experience in handling floodlight, sign, radio and flag pole problems of all kinds, we are able to offer architects, contractors and building owners a well rounded service in planning, detailing and specifying the flag pole and equipment best suited to each individual installation, location factor, and budget limitation.

We have an unusually wide selection of stock bases, and shall be glad to forward sketches of them. Complete catalogue will be sent on request.

We are also equipped to fabricate special bases in accordance with architects' sketches.

We suggest that rough sketches of contemplated flagpoles be submitted to us—in order that we may prepare details, specifications and estimates of complete costs. All services offered by **Traffic & Street Sign Co.** are, of course, without charge or obligation.

We likewise are able to recommend the maximum length and number of sections that assure the most economical freight rate to any part of the country.

CONTINUOUS TAPERED FLAG POLES

Continuous tapered flag poles are manufactured in two types: **Continuous straight taper, and Continuous entasis taper.** Straight tapered poles for roof and ground setting in copper-bearing steel are carried in stock up to 80 feet, and have a standard taper of approximately 1 inch in 7 feet. Quick delivery can be made on entasis taper, special taper, and standard taper poles up to 200 feet.

TELESCOPED SECTIONAL FLAG POLES

Telescoped sectional flag poles are manufactured in three types: **standard, heavy, and extra heavy.** Stock sizes in copper-bearing steel furnished in lengths up to 100 feet in both roof and ground-set poles. Quick delivery can be made on poles up to 200 feet. All the joints are die swaged and shrunk.

SAFETY NOTE

Architects working on new school buildings as well as all educational purchasing officials are urged to investigate the advantages for safety of steel as opposed to wood in flag pole construction. Wood poles which to all outward appearances are in good condition may have rotted inside to a point where they are early victims of the next strong blow. Furthermore, a good steel flag pole close to a building is excellent protection against lightning. Steel poles not only safeguard adjacent structures but can also be struck by a bolt without danger of collapse.

Bloomfield Junior High School
Bloomfield, N. J.

THE NEW "CADET" FLAG POLE

To meet the growing demand for a continuous tapered flag pole of light weight and at a cost within the reach of every school budget, **Traffic & Street Sign Co.** offers the "Cadet." This new flag pole has the same construction and proportioning, the same uninterrupted surface as our standard continuous straight tapered poles — but is reduced in height to 40 feet or less. (This permits a reduction in wall thickness and in weight.) It is built strong and safe — for trouble-free service under all conditions. It is guaranteed to withstand a wind pressure of 90 miles per hour. Its newly designed halyard truck assures satisfactory operation at all times. It can be ground set (with or without base); roof set (with braces or penetrating roof); or wall set (with a wide variety of supports). It can also be used as a light-weight outrigger pole. Stocked in four sizes for immediate delivery at surprisingly moderate cost.

OTHER PRODUCTS

"Slow," "Caution," "School Zone" signs, Parking Regulation signs, Posts and Standards for all type signs, Radio poles, Floodlighting Poles, etc.

(For further detailed information refer to Sweet's Catalog)

Index to Advertisers

These postcards are supplied for your convenience in securing catalogs or quotations without charge or obligation to you.

•

All requests will receive prompt attention.

The American School and University

Catalog Service Dept.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT No. 280 Sec. 384½ P. L. & R., NEW YORK, N. Y.

The American School & University,
470 Fourth Avenue,
New York, N. Y.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT No. 280 Sec. 384½ P. L. & R., NEW YORK, N. Y.

The American School & University,
470 Fourth Avenue,
New York, N. Y.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT No. 280 Sec. 384½ P. L. & R., NEW YORK, N. Y.

The American School & University,
470 Fourth Avenue,
New York, N. Y.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT No. 280 Sec. 384½ P. L. & R., NEW YORK, N. Y.

The American School & University,
470 Fourth Avenue,
New York, N. Y.

I should like to receive catalogs and price lists on the following products:--

Name (Title)

School

City State

42

I should like to receive catalogs and price lists on the following products:--

Name (Title)

School

City State

42

I should like to receive catalogs and price lists on the following products:--

Name (Title)

School

City State

42

I should like to receive catalogs and price lists on the following products:--

Name (Title)

School

City State

42

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue — Chicago, Illinois

Every International School Bus chassis combines sound design, sturdy construction, and modern mechanical refinements to provide safe transportation at low cost.

Before you invest in school transportation or award hauling contracts, make a thorough investigation and you will see why so many school boards insist on International Buses. More than 30 years of experience in the manufacture of quality automotive units is back of Internationals. Service is provided by 242 Company-owned branches and service stations and thousands of International dealers.

Write for the International School Bus catalog and for the "School Bus Cost Record," a simple method of keeping costs on school bus operation and maintenance.